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February 15, 2023

Mr. Stephen Jann
US EPA, Region 5
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SUBJECT: Drilling and Completion Report – Newton County Landfill IW-2
UIC Permit IN-111-1I-0002
Republic Services - Newton County Landfill

Dear Mr. Jann:

Included with this letter is an electronic copy of the Republic Services-Newton County Landfill Class I Facility, Newton County IW-2 Drilling and Completion Report. In addition to the electronic submittal, a paper copy of these materials has also been sent to the Region 5 EPA offices in Chicago. This report documents the installation and testing of Newton County IW-2 in Newton County, Indiana. The Class I well was drilled during the period of August to October 2022. The testing and completion of IW-2 was conducted during December 2022 and January 2023. It is noted that this report is being submitted within a 45-day window after the conclusion of well testing in order to best support the review process.

Respectfully,

Rodriquez, Tom

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Petrotek

Technical
Report

DRILLING & COMPLETION REPORT
REPUBLIC SERVICES – NEWTON COUNTY LANDFILL CLASS I FACILITY
NEWTON COUNTY LANDFILL IW-2
USEPA PERMIT: IN-111-1I-0002

Sec. 28-T29N-R8W

Class I Non-Hazardous Deepwell
Newton County, Indiana
Republic Services

February 15, 2023

Volume 1 of 3

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DRILLING & COMPLETION REPORT
NEWTON COUNTY LANDFILL IW-2 – REPUBLIC SERVICES
NEWTON COUNTY LANDFILL CLASS I FACILITY
NEWTON COUNTY, INDIANA
USEPA PERMIT: IN-111-1I-0002

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1.0 EXECUTIVE SUMMARY

This report documents the installation and testing of the Republic Services (Republic), Newton County Landfill (NCL) Class I injection well IW-2 in Newton County, Indiana. Following location preparation and installation of conductor pipe in July of 2022, the well was drilled from August 26 to October 15, 2022. A majority of the initial testing and completion was conducted during November and December 2022. After well stimulation, additional mechanical integrity and reservoir testing was completed in December of 2022 and January of 2023. Throughout this report, unless otherwise noted, drilling and completion depths are referenced to the drilling rig Kelly Bushing (KB) elevation (17 feet above ground surface).

The 20-inch diameter conductor casing was drilled to a depth of 88 feet using a dual rotary rig, so no annulus was created, and no cement was required. During the subsequent drilling process, two strings of carbon steel casing were set and cemented to surface as follows: 13 3/8-inch surface casing at 1,535 feet (KB) and 9 5/8-inch-long string protection casing at 3,277 feet (KB). Cement bond logs were run on the surface and protection casing strings to demonstrate isolation of the injection zone from identified or potential underground sources of drinking water (USDWs). Cement returns to surface were observed during each of the cement jobs.

After site preparation and conductor pipe had been installed, drilling the surface hole began on September 7, 2022. A total depth (TD) of 5,207 feet was reached on October 11, 2022, within the Mt. Simon Formation. A day versus depth curve is included as Figure 1. The well was installed as an openhole completion in the Mt. Simon injection interval from 3,277 feet (KB) to 5,207 feet (KB), in accordance with the EPA UIC permit. The rig down process began on December 21, 2022. All drilling equipment was demobilized from the site by December 29, 2022.

Drilling activities were supervised by Ed Pollister, a consultant to Republic Services. Completion activities were supervised by Douglas Torr, a consultant to Republic.

The official annulus pressure test was performed on December 21, 2022, and radioactive tracer (RAT) and temperature logging were conducted on December 28-29, 2022. Injection falloff testing was conducted on January 1, 2023. Figure 2 presents a well schematic that represents the current well configuration. Figure 3 shows the current wellhead configuration. The well was successfully completed for service as an injector that meets permit and regulatory requirements. Applicable EPA notifications and forms are presented as Attachment 8.

2.0 SUMMARY OF DAILY DRILLING ACTIVITIES

The information that follows is a chronological summary of daily activities compiled from daily reports. Daily activity reports from July 21, 2022 through October 15, 2022 are 24-hour reports starting at 6:00 a.m. the previous day.

A plot of drilling days versus depth is shown in Figure 1. Table 1 lists formation tops encountered during the drilling process. Bit records and deviation surveys are included in Tables 2 and 3, respectively. Table 4 presents the casing and cementing details for the surface and protection casing.

Date	Activity	Depth/Group (ft, KB)
07/21/2022	20” conductor casing to 105 feet below Kelly Bushing, 88 feet below ground level (BGL)	Depth: 88
08/26/2022	Finish moving in rig, all components on site, begin rig up	Depth: 88
08/27/2022	Rig 90% in place, 50% assembled	Depth: 88
08/28/2022	Rig 95% in place, 60% assembled, derrick in air.	Depth: 88
08/29/2022	Rig 100% in place, 80% assembled	Depth: 88
08/30/2022	Assemble rig, shut down for 1 week.	Depth: 88
09/06/2022	Finish rig up, weld on riser, mix spud mud, drill rat and mouse holes	Depth: 88
09/07/2022	Pick up BHA, drill from 0’ to 124’	Depth: 124
09/08/2022	Drill 124’ to 187’, repair mud pump #2	Depth: 187 Wabash
09/09/2022	Drill from 187’ to 460’	Depth: 460 Wabash
09/10/2022	Drill 460’ to 718’	Depth: 718 Wabash
09/11/2022	Drill from 718’ to 850’, POOH and change tri-cone bit for PDC bit	Depth: 850 Wabash
09/12/2022	Drill from 850’ to 974’	Depth: 974 Maquoketa
09/13/2022	Drill from 974’ to 1,157’	Depth: 1,157 Trenton
09/14/2022	Drill from 1,157’ to 1,470’, service rig	Depth: 1,470 St. Peter

Date	Activity	Depth/Group (ft, KB)
09/15/2022	Drill from 1,475' to 1,535', TD section, wiper trip, circulate in hole	Depth: 1,565 St. Peter
09/16/2022	TOOH, rig up wireline, run GR, SP, and triple combo with caliper, rig up casing crew, run 37 joints 13 3/8" casing	Depth: 1,565 St. Peter
09/17/2022	Circulate, rig up cementers, pump cement, 150 bbl returns, bump plug at 1,200 psi, float held. Wait on cement	Depth: 1,565 St. Peter
09/18/2022	Cut 13-3/8" casing, cement visible at surface, weld on slip-on wellhead and test to 600 psi, nipple up and test BOP, finish test BOP	Depth: 1,565 St. Peter
09/19/2022	TIH with 12 ¼" bit, drill show, displace fresh water, drill from 1,535' to 1,671'.	Depth: 1,671 St. Peter
09/20/2022	Drill from 1,671' to 1,875, POOH to replace bit	Depth: 1,875 Shakopee
09/21/2022	POOH for bit, pick up new bit, TIH drill from 1,875' to 1,933'	Depth: 1,933 Shakopee
09/22/2022	Drill from 1,933' to 2,209'	Depth: 2,209 Shakopee
09/23/2022	Drill from 2,209' to 2,420'	Depth: 2,420 Ironton
09/24/2022	Drill from 2,420' to 2,658'	Depth: 2,658 Eau Claire
09/25/2022	Drill from 2,658' to 2,863'	Depth: 2,863 Eau Clair
09/26/2022	Drill from 2,863' to 3,076'	Depth: 3,076 Eau Claire
09/27/2022	Drill from 3,076' to 3,277', encountered top of Mt. Simon at 3,166'.	Depth: 3,277 Mt. Simon
09/28/2022	Circulate, rig up wireline, run triple combo, FMI, and caliper. Rig down wireline, TIH	Depth: 3,277 Mt. Simon
09/29/2022	Circulate for casing, POOH and lay down BHA, rig up casing crew, run 79 joints of 9-5/8" casing, circulate for cement	Depth: 3,277 Mt. Simon
09/30/2022	Condition hole, rig up cementers, cement with 75 bbls returns, WOC	Depth: 3,277 Mt. Simon

Date	Activity	Depth/Group (ft, KB)
10/01/2022	WOC	Depth: 3,277 Mt. Simon
10/02/2022	WOC, rig up wireline, run CBL and USIT cased hole logs, wait on BOP testers	Depth: 3,277 Mt. Simon
10/03/2022	Test BOPs, wait on drill collars, TIH	Depth: 3,277 Mt. Simon
10/04/2022	TIH, test casing to 1,000 psi, drill shoe track, drill 3,282' to 3,315', POOH for bit, TIH	Depth: 3,315 Mt. Simon
10/05/2022	TIH, drill 3,315' to 3,776'	Depth: 3,776 Mt. Simon
10/06/2022	Drill from 3,776' to 4,269', losing 20 bbls per hour	Depth 4,269 Mt. Simon
10/07/2022	Drilled from 4,269' to 4,375', POOH for bit, PU new bit, TIH, ream from 4,202' to 4,317'	Depth: 4,375 Mt. Simon
10/08/2022	Ream hole, circulate, POOH, PU magnets, fish for bit, PU new bit, TIH	Depth: 4,375 Mt. Simon
10/09/2022	Circulate hole, drill from 4,375' to 4,694'	Depth: 4,694 Mt. Simon
10/10/2022	Drill 4,694 to 4,804', POOH for bit, TIH	Depth: 4,808 Mt. Simon
10/11/2022	Ream, drill 4,804' to 5,207', TD well at 5,207'	Depth: 5,207 Mt. Simon
10/12/2022	Circulate, POO, rig up wireline, run open hole logs	Depth: 5,207 Mt. Simon
10/13/2022	Finish open hole logs, cut 16 sidewall cores	Depth: 5,207 Mt. Simon
10/14/2022	TIH, Circulate, lay down drill pipe, rig down	Depth: 5,207 Mt. Simon
10/15/2022	Rig down move out.	Depth: 5,207 Mt. Simon

3.0 GEOLOGIC SUMMARY

A summary of the formation tops (stratigraphic picks based on geophysical logs) from IW-2 are listed in Table 1. Ground surface elevation is 704 feet above mean sea level (AMSL). The kelly bushing (KB) elevation is 721 feet AMSL, which is 17 feet above ground surface. All depths are reported in measured depth from KB unless otherwise noted. Mud logging included use of a gas chromatograph to provide continuous gas monitoring. In addition, the wireline logging conducted in the IW-2 well are provided as Appendix A and include triple combo, combined magnetic resonance (CMR), and Fullbore Micro Imager (FMI) logs. Reported depths from the mud log were confirmed versus wireline logs and adjusted as necessary by Petrotek in Table 1. A summary of log runs is provided in Table 5 and discussed in Section 4.0. Sidewall core collection and analyses as well as formation fluid sampling and analyses were also conducted and are discussed in Section 5.0.

The top of the Confining Zone defined as the Eau Claire is contacted in IW-2 at 2,590 feet (1,869 feet below mean sea level (BMSL)). The base of the Eau Claire is reported at 3,164 feet (2,443 feet BMSL) for a total thickness of 574 feet at IW-2. The upper Eau Claire is described as a dark grey dolomite that transitions into grey shales and light brown and gray brown siltstones. At approximately 2,830 feet, the Eau Claire transitions to predominantly red brown and dark gray shales with minor sandstone interbeds, and at 2,980 feet the formation is predominantly off-white to buff sandstone with minor shales and dolomites present and contains glauconites and trace amounts of mica.

The Mt. Simon Formation is contacted at 3,164 feet (2,443 feet BMSL) and is more than 2,000 feet thick at IW-2. The Mt. Simon is described as a mostly clear to somewhat milky colored fine to very fine-grained sandstone at the top. It transitions to a light tan and red brown and pink fine to medium grained sandstone at approximately 3,750 feet, and transitions back to fine to very-fine grained at approximately 4,050 feet, with some notes of unconsolidated formation present. Scattered to trace granitic fragments are noted within the Mt. Simon from depths of approximately 4,870 to 4,910 feet, as well as from depths greater than 5,100 to total depth.

Note that the mud log (Attachment A) indicates the presence of a “granite wash” at approximately 4,870 feet and from 5,107 feet to total depth. The presence of trace granitic fragments within these intervals of the Mt. Simon is not indicative of a “granite wash”. As seen on the mudlog, as well as on the Integrated Petrophysical Analysis processed log (Volume 3), the Mt. Simon is predominantly (>95%) quartz sandstone, noted as more arkosic and with trace granitic fragments in the lower ~100 feet of the openhole completion. A true “granite wash” is composed of predominantly fractured granitic material directly overlying the Precambrian basement. The observed granitic materials within the Mt. Simon are inferred to represent reworked granitic material within the lower several hundred feet of this formation, consistent with lower Mt. Simon identified elsewhere to the north in the Michigan Basin. The Precambrian basement or a fractured “granite wash” was not contacted based on the wireline log responses or cuttings report.

Fluid losses were reported from depths of approximately 3,700 to 3,850 feet and from

approximately 3,990 feet to total depth. The average porosity from density porosity of the Mt. Simon is approximately 11-12%. Six rotary sidewall core samples were recovered from the openhole and analyzed for porosity and permeability in the Mt. Simon, at depths from 3,990 to 5,056 feet, with porosities that range between 9.8% to 12.6%, with an average porosity of 11.4%. Klinkenberg permeability from the core samples ranged from 0.192 to 24.5 millidarcies. An average horizontal permeability of 9.7 millidarcies was determined for these samples from the Mt. Simon. Core data is presented in Section 5.0 and Table 6.

4.0 LOGGING SUMMARY

A variety of geophysical well logs were run to acquire information from both the open and cased-hole portions of the well. A copy of each log is included in Appendix A. Log vendor, type, date run, and depth intervals covered are summarized in Table 5.

The logs run in the surface casing section of the well included a caliper, gamma ray, triple combo, induction, high-resolution density, compensated neutron, variable density, and cement bond log. The logs run in the protection casing section included caliper, gamma ray, power position caliper, ultrasonic, cement evaluation, variable density, digital sonic, casing integrity, and cement bond logs through the interval. The completed section of the injection zone was subjected to a gamma ray, borehole compensated sonic, cement bond, and variable density log.

During completion activities a radioactive tracer log and temperature log were run to demonstrate Part II external mechanical integrity and are discussed further in Section 8.0. The radioactive tracer log and temperature log are included as Attachments 10 and 11, respectively.

5.0 SAMPLE COLLECTION SUMMARY

Drill cutting samples were collected at regular intervals during drilling operations to document the stratigraphy and lithology of the geologic section. A mudlog that provides descriptions of cuttings and formation tops is provided in Attachment 1. These data were used to confirm and assist with the analysis of the geophysical well logging data that was collected.

Sidewall core data were collected from the Mt. Simon Formation within the injection zone from depths of 3,990 feet KB to 5,056 feet KB, with 6 recovered cores. Note that conventional core plug analyses (porosity, Klinkenberg and air horizontal permeability, and grain density) are provided in Attachment 2. Table 6 summarizes the results of these conventional core analyses.

Table 6. Conventional Core Analyses, NCL IW-2

Depth (ft. KB)	Porosity	Permeability, Klinkenberg (md)	Permeability, Air (md)	Grain Density (g/cc)
3990.1	11.0%	11.9	14.7	2.63
4211.9	12.6%	14.3	17.4	2.64
4360.0	12.3%	5.99	7.86	2.64
4601.9	10.5%	0.192	0.919	2.64
4786.0	12.0%	24.5	28.7	2.64
5056.0	9.8%	1.41	2.05	2.65

As required by the permit, representative formation fluid samples were collected from the Mt. Simon injection interval during the completion of the well. These samples were collected by swabbing fluid through 2 7/8-inch tubing with a packer set with center element at 3,183 feet KB.

After a total of approximately 2,956 bbls of fluid was swabbed from the injection zone and field parameters had stabilized, formation fluid samples were collected and submitted for laboratory analysis. Field data for the swabbed fluids is provided as Attachment 3. Laboratory analysis indicates that Mt. Simon formation fluids contain approximately 130,000 mg/L TDS. Laboratory reports of fluid sampling are provided as Attachment 4.

6.0 CASING AND CEMENTING SUMMARY

As noted in Section 1.0, after the 20-inch conductor casing was set at 88 feet, rotary drilling was used to reach target depths and set an intermediate and protection string of casing and cement both strings to surface. The two strings of casing include a 13 3/8-inch surface casing, and a 9 5/8-inch protection casing. Cement was circulated to surface during the surface and protection casing cement jobs. A diagram of the IW-2 construction configuration is presented on Figure 2.

The 13 3/8-inch surface casing was installed on September 16, 2022 with the casing shoe set at a depth of 1,535 feet KB. The 13 3/8-inch casing is 54.5 pound per foot (lb/ft), J-55 grade with buttress threads. The surface casing was cemented using a lead of 855 sacks of 13.1 pounds per gallon (ppg) cement and a tail of 500 sacks of 15.6 ppg cement. The cement was circulated to surface with 150 barrels of cement returned to surface tanks. Details of the casing and cementing for the surface section are included in Table 4.

The 9 5/8-inch, 36 lb/ft protection casing was installed on September 29, 2022, with the casing shoe depth set at 3,277 feet KB. The protection casing consists of J-55 grade with LTC threads. The protection casing was cemented using a lead cement of 471 sacks of 13.1 ppg cement. The tail slurry included 613 sacks of 15.6 ppg cement. 79 barrels of cement were returned to surface. Details of the protection casing and cementing are included in Table 4.

Attachment 5 presents mill certifications for the new surface and new protection casing strings installed in IW-2. For each casing string, full-length drift and visual thread inspection was performed at the mill prior to shipment and on location before running in the well.

The cementing reports and casing tallies for the surface and protection casing strings are presented as Attachments 6 and 7, respectively. Cement was observed at surface after the cement had cured (i.e., no fallback) in the surface and protection casing string cement jobs.

7.0 SUMMARY OF COMPLETION ACTIVITIES

Completion activities commenced on November 28, 2022, and were finished on January 2, 2023.

After rigging up a completion rig, a blowout preventer (BOP) was installed and a safety inspection was performed. After fluid sampling was complete, injection tubing and packer were run in the well. The AS-1X coated nickel packer was set in tension with the center element at 3,212 feet KB. A 100-gallon diesel blanket was then pumped and spotted below the packer between the injection tubing and protection casing and the wellhead was installed and tested. The tubing/casing annulus was filled with 9.0 ppg inhibited brine. Figures 2 and 3 present the wellbore and wellhead diagrams, respectively. A wellbore schematic from the drilling supervisor is provided as Attachment 16.

Acid stimulation was conducted beginning on December 2, 2022 using a 2 3/8" coil tubing unit, with the coil spotted at 5,200 feet. Pumping of 15% HCl was conducted at 2 bpm. Rate was increased to 3 bpm and 6,048 gallons of HCl acid was pumped. The acid was displaced with 50 barrels of brine down the tubing and 102 barrels of brine down the casing.

Fluid sample collection operations were then conducted via swabbing through the workstring and retrievable packer. A total of 1,224 barrels were recovered on December 5-13, 2022, reaching field parameter stabilization after approximately 370 barrels. After the first portion of swabbing was completed, the retrievable packer and workstring were removed from the well. To ensure that drilling and stimulation fluids did not affect the samples, an additional 1,732 barrels were swabbed through the casing during the period of December 13-16, 2022.

After the injection string was installed, mechanical integrity and reservoir testing activities were conducted. Testing included an annulus pressure test to demonstrate Part I integrity, radioactive tracer and temperature logs to demonstrate Part II integrity, a static gradient survey and a reservoir falloff test to collect initial ambient reservoir monitoring data. These tests are discussed in further detail in Sections 8 and 9. At the time of this report, surface, pumping, and control facilities are under construction.

The following is a chronological summary of daily completion activities compiled from daily reports. Daily activity reports from November 28, 2022 through January 2, 2023 start the morning of the date listed.

Date	Activity
11/28/2022	Move in rig.
11/29/2022	Spot Complete well service rig, install BOPs and test, shut blind rams, shut in for night (SIFN).

Date	Activity
11/30/2022	Unload completion rig equipment, SIFN.
12/01/2022	TIH, tag TD at 5,207', flush with brine, pressure test tubing to 2,000 psi, SIFN.
12/02/2022	TIH with swab line, fill hole with salt water, circulate up tubing, rig up acid wash, spot 72 bbls of 15% HCL from 5,200' to 4,200', spot 72 bbls of 15% HCL from 4,200' to 3,277', SIFN.
12/03/2022	Displace acid into formation, TOOH, pick up 9-5/8" packer and TIH, set packer at 3,185', SIFN.
12/05/2022	Tag CSN at 3,175' start swabbing, recover 226 BLW.
12/06/2022	Swab, recover 243 BSW, SIFN.
12/07/2022	Swab recover 114 BSW, make sinker bar run, SIFN.
12/08/2022	Fish swab cups, recover 13 BSW, SIFN.
12/09/2022	Release packer, lay down tubing, TIH and recover swab rubbers, set packer at 3,183', rig up to swab, hauled off 330 bbls of swab water, SIFN.
12/10/2022	Swab, recover 267 BSW, SIFN.
12/12/2022	Swab, recover 227 BSW, SIFN.
12/13/2022	Swab, recover 487 BSW, SIFN.
12/14/2022	Swab, recover 436 BSW, SIFN.
12/15/2022	Swab recover 540 BSW, SIFN.
12/16/2022	Swab, recover 438 BSW, SIFN.
12/17/2022	Release packer, lay down workstring, move 3-1/2" tubing off rack, put 4-1/2" tubing on rack, SIFN.
12/19/2022	Change BOP rams, rig up casing crew, pick up 2 joints of tubing, SIFN.
12/20/2022	TIH with 76 joints of tubing, set packer at 3,212', end of tubing at 3,280', spot 190 bbls of inhibited packer fluid and 30 gallons of diesel on top, pressure test casing at 800 psi for half an hour, no bleed off, SIFN.

Date	Activity
12/21/2022	Run annulus MIT, start pressure 1,058 psi, final pressure 1,066 psi. Nipple down floor and BOP, nipple up master valve, pump 100-gal diesel blanket, flush end of tubing with 51 BSW, RD service rig, nipple up half of tree, and test.
12/28/2022	Rig up wireline, run temperature log, mix water for RAT survey, SIFN.
12/29/2022	Rig up wireline and pump truck, run RAT survey, SIFN.
12/30/2022	Mix 1,400 bbls of 2% KCL water.
12/31/2022	Run in gauges, pump 1,122 bbls for 18 hours, shut in for 12 hours.
01/01/2023	Injection / Fall off test.
01/02/2023	POOH, making gradient stops every 500'. Rig down slickline, rig down move out.

8.0 Mechanical Integrity Testing

The procedures followed to conduct integrity tests were approved in advance by EPA. A wellbore diagram illustrating the configuration during testing activities is presented as Figure 2. Procedures and a copy of the form documenting the testing are presented in Attachment 8. Gauge calibration certifications are provided in Attachment 9.

PART I: INTERNAL MECHANICAL INTEGRITY

An annulus pressure test (APT) was performed on December 21, 2022, using a calibrated pressure gauge (Crystal Gauge, SN – 216483). The test was unwitnessed as directed by EPA. The annulus was pressured to 1,056.7 psi and monitored for a period of one hour at 10-minute intervals, as shown in Table 7. During the test, the pressure increased by 9.6 psi, which is a 0.9% change. Since a change of +/- 3% of the starting test pressure (32 psi) was allowable, this test is within acceptable specifications.

TABLE 7
ANNULUS PRESSURE TEST MEASUREMENTS

Time, minutes	0	10	20	30	40	50	60
Pressure, psi	1,056.7	1,058.3	1,060.0	1,063.3	1,063.3	1,064.8	1,066.3

PART II: EXTERNAL MECHANICAL INTEGRITY

Radioactive Tracer Log

The primary purpose of a Radioactive Tracer (RAT) log is to verify the adequacy of the bottomhole cement surrounding the protection casing. The RAT log was conducted following the approved MIT testing procedures submitted to EPA before commencement of field activities and is consistent with applicable guidance documents for mechanical integrity testing of Class I UIC wells.

RAT Field Activities & Results

Field activities associated with the RAT log performed December 29, 2022, are summarized below.

- Injection pressure, rate, and total fluid volume were monitored and recorded using the site injection equipment. Freshwater injection took place for RAT logging activities.

- The lubricator was opened and the RAT tool was run in the hole. The RAT tool tagged bottom at 0855 hrs., at which point the baseline log was run to establish background conditions.

- The initial gamma-ray (GR) base log (with casing collar locator for depth synchronization) was run from approximately 5,194 feet BGL up to approximately 2,196 feet BGL.

- Two 5-minute statistical variation logs were conducted with the bottom detector positioned at 2,550 feet and 3,290 feet BGL.

- The tracer chase sequence was conducted with tracer ejected at 2,212 feet BGL. Fluid was injected at a constant rate of approximately 42 gallons per minute (gpm) at a wellhead pressure of approximately 20 psi. A total of seven overlapping passes were logged to follow the radioactive tracer into the openhole completion.

- A 60-minute time-drive was conducted with tracer ejected at 2,212 feet BGL and bottom detector set at 3,222 feet BGL. Fluid was injected at a rate of approximately 42 gpm at a wellhead pressure of approximately 20 psi. Only downward movement of the slug through the tubing was detected.

- A post-test GR log was conducted from approximately 5,202 feet up to approximately 2,118 feet BGL.

The RAT logging was conducted utilizing a dual GR detector tool. The tool also included a casing collar locator (CCL) and a radioactive material ejector positioned above the top GR detector. A schematic of the RAT tool is included as part of the RAT log in both paper and digital form.

Unified analysis of the chase series, the time drive, and the similar nature of the base and final gamma-ray logs indicate that no tracer material was detected outside of the permitted injection interval, thereby demonstrating external mechanical integrity. A copy of the RAT log in paper and digital form is included as Attachment 10.

Temperature Log Field Activities & Results

On December 28, 2022, prior to running the RAT log, a static temperature survey was conducted in IW-2 from the surface to approximately 5,206 feet BGL. This logging took place after the well had been shut-in in for several days. The temperature tool assembly also included a CCL and a gamma-ray tool. These data were collected to establish baseline conditions, to verify depth, and correlate lithologic changes with temperature variations. The log data were acquired at speeds of approximately 20 to 30 feet per minute.

Calibration information for the temperature tool is provided as part of the temperature log. Prior to performing the temperature logging activities, field verification of the tool readings was performed. In cold water, the tool read approximately 45.2 °F while a thermometer read an average of 45.5 °F. The tool and thermometer were then placed in a bucket of warm water where the tool recorded a value of 92.9 °F and a thermometer value of 93.3 °F. These readings verified the tool calibration.

Based on the lack of any temperature anomalies consistent with upward flow it was determined that there is no evidence of flow above the injection zone and the log indicates external mechanical integrity. The fluid injected during drilling and completion activities is clearly shown on the signature of the log as entering the permitted injection interval. A copy of the static temperature log and digital log data is presented as Attachment 11. A letter of log interpretation supporting the interpretation offered in this report is included with the log.

Results Summary

The results of the MIT conducted, including the static APT, temperature, and RAT logs, satisfy the applicable EPA requirements for demonstrating the initial internal and external mechanical integrity of the well. Testing was conducted as detailed in the approved procedures. A casing inspection log was also conducted to establish baseline conditions of the new protection casing. A copy of this log is included as Attachment 15.

The APT, temperature, and RAT logs demonstrated that the casing, tubing, wellhead, packer, and annulus satisfy EPA internal integrity (Part I) and external integrity (Part II) requirements. Certified equipment was used to conduct these tests.

EPA was provided and accepted a copy of the certificate for the certified pressure gauge. Additionally, EPA field inspectors were notified of field activities and were not present to witness the annulus pressure test.

All testing and logging were completed using standard industry methods. Analyses of the data completed by experienced log and test analysts at Petrotek and the logging service company indicate that the logging was successfully completed and IW-2 is in a condition suitable for injection operations.

9.0 Reservoir Testing

This section summarizes the January 2023 reservoir testing activities performed at the Newton County Landfill facility. The Newton County Landfill IW-2 pressure transient testing was conducted in accordance with procedures approved by EPA. The test notification and approval are provided as Attachment 8. The primary objectives of this field mobilization included reservoir testing intended to allow completion of the well and establish baseline reservoir conditions and injection parameters for the well to obtain authorization to inject. The reservoir testing consisted of an injection falloff pressure transient test.

The Newton County Landfill IW-2 Class I disposal well was completed in the Mt. Simon Formation during this testing, and communicates to the injection interval via an 8 ½-inch openhole completion below 9 5/8-inch steel casing with a shoe at 3,277 feet KB. The top of the permitted injection interval is at a depth of 3,164 feet KB (top of the Mt. Simon Formation, based on well logs). The well is completed with a packer top at 3,212 feet and tail pipe below the packer to 3,280 feet KB. The configuration of the well at the time of testing is provided as Figure 2.

The rate data and downhole pressure data are of reasonable quality and are sufficient to allow estimation of certain reservoir characteristics. The field operations, test procedures, analytical methods, and results are presented in the following discussion.

Initial Pressure and Temperature of Injection Zone

To begin the testing process, dual memory gauges were run in the injection tubing to a depth of 3,170 feet KB (3,153 feet BGL) on slickline. Gradient stops were made on the way into the well. Stabilized static bottomhole pressure was recorded for approximately 4.3 hours before constant rate injection was started. The data acquired indicate that the original static bottomhole pressure of the injection formation currently in communication to the wellbore was approximately 1,328 psig at 3,170 feet KB (3,153 feet GL). This measurement implies a static formation reservoir pressure gradient of 0.421 psi/ft. Concurrent temperature measured near the top of the completion with the pressure transducer assembly prior to injection was approximately 83.5 °F.

Injection Build-up Falloff Pressure Transient Test

Specific Field Activities

Pressure transient testing in the form of an injection falloff test was conducted in the well. Raw bottom hole pressure data, rate data from the site pump, and reports from the field vendors are included as Attachments 12, 13, and 14, respectively. Noteworthy details summarizing the reservoir testing are summarized below:

- Constant rate injection began at 1404 hours on December 31, 2022 at a stabilized rate of 45.4 gpm. During the build-up period, surface pressure and injection rate were recorded at one-second intervals.

- The well was shut-in at 0806 hours on January 1, 2023 after approximately 18.0 hours of constant-rate injection.

- Pressure falloff data was collected at 5-second intervals for approximately 23.4 hours after shut-in using bottomhole gauges. Gauges were hung at a test depth of 3,153 feet BGL.

Data Collection

Although a more substantial gross thickness of injection zone exists in the vicinity of the well location, the analyses were performed using a net effective thickness of 583 feet with an average effective porosity of 10%. Using these values to represent the combined, net effective thickness of the injection interval is consistent with geologic evaluation of the geophysical well logs and cores and represents the portion of the gross interval most likely to accept fluid. Although additional thickness may accept fluids, the geophysical log analysis indicates that fluid flow and well behavior is likely to be dominated by this net thickness. A net to gross thickness ratio of less than 50% is not uncommon for injection wells that are completed in the Mt. Simon Formation in Indiana.

The formation viscosity, fluid compressibility, and total compressibility were estimated using bottom hole temperature and pressure recorded in the well at the depth of the injection interval, in conjunction with industry standard correlations. These correlations are presented in *The Properties of Petroleum Fluids* (McCain, 1990) and the SPE textbook on Pressure Transient Testing which was published as part of the SPE Textbook Series as Volume 9.

The salinity of the native brine fluid from the injection zone was approximated as 13.0%, based on the 130,000 mg/L TDS brine concentration determine to be present in original formation fluid samples. A bottom hole temperature of 83.5 °F has been used as representative of the formation for these correlations.

Fluid viscosity was estimated using multiple equations developed by McCain that first are used to estimate fluid viscosity at atmospheric conditions (equations B-72, 73, and 74), which is then converted to viscosity at bottom hole conditions (equation B-75) by using a correction factor. These equations can be found on page 527 of the McCain text. As a primary input for the correlation, pressure is required. The formation pressure at the gauge depth of 3,153 feet BGL was initially measured at 1,343 psia. At this pressure and a temperature of 83.5 °F, the following equations have been used to derive viscosity:

$$\mu_{w1} = AT^{B} \quad \text{(B-72)}$$

$$A = 109.574 - 8.40564 * S + 0.313314 * S^2 + 8.72213 * 10^{-3} * S^3 \quad \text{(B-73)}$$

$$B = -1.12166 + 2.63951 * 10^{-2} * S - 6.79461 * 10^{-4} * S^2 - 5.47119 * 10^{-5} * S^3$$

$$+ 1.55586 * 10^{-6} * S^4 \quad \text{(B-74)}$$

$$\frac{\mu_w}{\mu_{w1}} = 0.9994 + 4.0295 * 10^{-5} * P + 3.1062 * 10^{-9} * P^2 \quad \text{(B-75)}$$

Where,

μ_{w1} is the viscosity of the formation fluid at atmospheric conditions
T_F is the bottom hole temperature in °F
S is the percent of solids
P is the bottom hole pressure in psi
μ_w is the viscosity of the brine at bottom hole conditions

Using these equations, a value of 0.82 centipoise is calculated for the formation fluid viscosity.

Formation compressibility was estimated using equation L-89 in the SPE Textbook Series Volume 9, provided on page 337. This equation was developed for sandstone formations, consistent with the primary composition of the effective injection interval.

$$c_f = \frac{a}{(1+bc\Phi)^{\frac{1}{b}}} \quad \text{(L-89)}$$

Where,

a = $97.32 * 10^{-6}$
b = 0.6999
c = 79.82
Φ = 0.10
c_f = Formation compressibility

Based on this equation, a value of 6.58E-6 psi^{-1} is derived for formation compressibility.

Fluid compressibility was estimated using figures L-30 and L-31 on page 338, with a bottomhole temperature of 83.5 °F, a bottom hole pressure of 1,343 psi, and a dissolved solids concentration of 13.0%. Using Figure L-31 to first estimate freshwater compressibility, a value of 3.12E-06 psi^{-1} is derived. Using Figure L-30, the coefficient of isothermal compressibility (ratio of brine compressibility over freshwater compressibility) was determined to be approximately 0.79. This results in a value of 2.46E-06 psi^{-1} for the formation fluid compressibility (c_w). By combining the formation and formation fluid compressibility, the total system compressibility is determined. The total system compressibility (c_t) is approximately 9.04E-06 psi^{-1}. Table 8 summarizes the reservoir and fluid input values used in the falloff test analysis.

After approximately 18.0 hours of stabilized 2% KCl brine injection, the well was shut-in by stopping the injection pump. The final flow rate recorded by the monitoring system was 1,574 bwpd (45.9 gpm) at a corresponding bottomhole flowing pressure of 1,383.4 psig. The pressure in the Mt. Simon Sandstone injection interval was then recorded for

approximately 23.4 hours after shut-in. Bottomhole pressure declined to 1,332.8 psig by the end of the test.

Data Analysis

There are several items critical to test analysis, including data regarding the well and formation, along with data regarding the fluids involved in the testing process. Evaluation of these data was conducted using a value of 583 feet as the probable effective thickness. This is less than 35% of the gross injection zone thickness completed at the site. Rates were determined based on site pumping equipment. A value of 0.82 centipoise was assigned as a representative viscosity of the fluids through which the pressure transients analyzed in this test traveled. The rest of the values used to initialize the analysis are provided in Table 8.

TABLE 8
FALLOFF TEST ANALYSIS INPUT VALUES

Parameter	Value	Unit
Formation Thickness, h	583	feet
Porosity, Φ	10	percent
Viscosity, μ	0.82	centipoise
Formation Compressibility, c_f	6.58 E-06	1/psi
Total Compressibility, c_t	9.04 E-06	1/psi
Formation Volume Factor, B_w	1.01	bbl/stb
Wellbore Radius, r_w	0.354	feet
Final Well Flowing Pressure, p_{wf}	1,383.4	psig
Final Injection Rate, q_{final}	1,574 45.9	bwpd gpm

The following figures have been prepared to examine and analyze the pressure transient test data:

- Figure 4 - Cartesian Plot of Pressure, Temperature, and Rate vs. Time
- Figure 5 - Cartesian Plot of Pressure Falloff
- Figure 6 - Log-log Derivative Plot
- Figure 7 - Semi-log Horner Plot
- Figure 8 - Cartesian Plot of Pressure Falloff with Model Match
- Figure 9 - Log-log Derivative Plot with Model Match
- Figure 10 - Semi-log Horner Plot with Model Match

Figure 5 shows that after an initial period of clean-up and displacement of the test brine to the gauge depth, relatively stable injection pressure was experienced through the second half of the constant-rate injection period. It is evident from the examination of the log-log plots (Figure 6 and 9) that early-time data are dominated by wellbore storage effects. Soon after, the slope of both the pressure and pressure derivative begin to decrease as the well transitions to radial flow. No square root pseudo-slopes are apparent in the test. At approximately 0.1 hours, the data are transitioning from early to middle-time and is approaching a probable radial flow period in the Mt. Simon. These data are suitable for classical analysis.

From approximately 0.01 to 0.1 hours, a slow downward slope is present in the derivative data that may be representative of minor partial penetration effects, differential skin or crossflow within the large-thickness completion interval that is open to multiple sub-layers within the Mt. Simon. Flow may be coming to equilibrium within the through near-wellbore vertical communication between layers. Soon after shut-in, the onset of what appears to be radial flow in the injection zone is shown on Figure 6 as a green line starting at approximately 0.1 hours. This radial flow period lasts until approximately 0.22 hours after shut-in, at which point the derivative begins to increase for a short period before decreasing again at the end of the test. This end of classic middle-time behavior and a transition into a late-time period after approximately 0.22 hours of shut-in may be due to several factors. The Mt. Simon Formation is known to be layered. This presents the potential for cross-flow after shut-in with possible heterogeneous properties and differential skin effects in different layers. After the short duration of injection there also exists the potential for radial composite mobility effects due to variable viscosity with distance from the well that leads to noticeable late-time behavior during testing.

A straight-line Horner analysis was performed on the test data. This analysis is presented in Figure 7. The Semi-log Horner Plot (Figure 7) shows the period of possible radial flow consistent with the diagnostic plots. From this analysis, a permeability-thickness of approximately 20,639 md-ft and a P* value of 1,347.9 psia (3,153 feet BGL) are derived. For an effective reservoir thickness of 583 feet, an average permeability of 35.4 md is derived. A skin factor of -1.9 units is derived in this analysis.

In addition to this analysis, a simulation match was performed using an analytical welltest model. This simulation analysis is presented in Figures 8 through 10. Modeling included the use of changing wellbore storage, limited entry (aka partial penetration), and radial composite tools to represent the data. The simulation included the assumption that infinite acting radial flow exists in the reservoir. A permeability thickness of approximately 21,958 md-ft is derived from this model. Instead of P*, the simulator is used to output a value for the extrapolated initial pressure. The modeled initial pressure was 1,345 psia (3,153 feet BGL) which is consistent with the measured original pressure of 1,343 psia. For an effective reservoir thickness of 583 feet, an average permeability of 37.7 md and a skin factor of -3.1 units is derived from the simulation. The simulation values are consistent with the Horner analysis method results.

The objective of the reservoir testing was to identify initial reservoir properties and well injectivity behavior and to confirm that formation properties and pressures are consistent with those expected based on offset wells. These goals were successfully achieved. No concerns relevant to operation, safety, or containment were identified. No boundaries are indicated at this time. The proposed Republic data acquisition and wellhead injection pressure monitoring practices will provide indications of injectivity changes and are sufficient to ensure operation at permitted injection pressures. This testing and analysis confirm that the Republic Newton County Landfill IW-2 well and the Mt. Simon disposal reservoir are suitable for disposal use.

TABLES

TABLE 1
FORMATION TOPS, NCL IW-2

KB Elevation (ft AMSL): 721
GL Elevation (ft AMSL): 704

Formation	IW-2 Formation Top (ft, KB)	IW-2 Subsurface Depth (ft, BGL)	IW-2 Top Elev. (ft, AMSL)
Glacial Sediments	17	0	704
New Albany Shale	138	121	583
Traverse Limestone	159	142	562
Wabash	188	171	533
Maquoketa	854	837	-133
Trenton	1,058	1041	-337
Black River	1,248	1231	-527
Glenwood	1,398	1381	-677
St. Peter Sandstone	1,431	1414	-710
Knox Group / Shakopee	1,686	1669	-965
Franconia	2,365	2348	-1,644
Ironton	2,400	2,383	-1,679
Galesville	2,538	2,521	-1,817
Eau Claire	2,590	2,573	-1,869
Mt Simon	3,164	3,147	-2,443
Total Depth	5,207	5,190	-4,486

TABLE 2
BIT RECORD

Bit Run #	Diameter (in.)	Make	Model	S/N:	Depth in (ft. KB)	Function
1	17.5	Reed	HP41A	TQ33231	0	Surface Hole
2	17.5	Ulterra PDC	T41	TQ3321	850	Surface Hole
3	12.25	Ulterra PDC	CF716	58902	1,535	Intermediate Hole
4	12.25	Smith	GF47Y	PT1167	1,875	Intermediate Hole
5	8.75	Smith	MFDGH	RA7502	3,277	Protection Hole
6	8.5	Varel	ETD04	1599585	3,315	Protection Hole
7	8.5	Varel	RRMT	RA0568	4,375	Protection Hole
8	8.5	Smith	F3HOD	RH3146	4,375	Protection Hole
9	8.5	Smith	GF45YDDIPS	PY7871	4,804	Protection Hole

TABLE 3
DEVIATION SURVEYS

Depth (ft. KB)	Inclination	Azimuth
63	1	65
116	1.7	326
160	1.1	330
190	1.2	327
246	1.1	328
301	0.8	325
368	0.3	350
468	0.3	34
527	0.2	22
574	0.3	23
650	0.2	42
749	1.1	48
928	0.8	133
1,181	0.6	48
1,305	0.2	165
1430	0.8	324
1,589	0.5	120
1,714	0.5	85
1,746	0.6	85
1,809	0.6	102
1,871	0.5	91
1,964	0.3	104
2,059	0.3	91
2,184	0.3	131
2244	0.1	97
2372	0.2	118
2404	0.1	119
2499	0.2	121
2,624	0.3	109
2,718	0.4	122
2,840	0.9	161
2,963	1.3	168
3,059	1.2	165
3,375	0.1	356
3,620	0.2	10
3,695	1.64	147
4,145	1.85	159
4265	1.9	162
4,385	1.75	158
4,536	1.53	151
4,685	1.08	147
4,805	1.02	147
4,926	1.03	144
5,045	0.88	145
5,165	1.11	153

TABLE 4
CASING AND CEMENTING INFORMATION, NCL IW-2

Cementing Summary - Surface Casing

Casing Size & Specifications	13 3/8”, 54.5 lb/ft / J-55, BTC
Date Cemented	9/16/2022
Casing Setting Depth	1,535 ft KB
Hole Diameter	17 1/2”
Pre-flush	45 bbls
Lead Cement	855 sacks of 13.1 ppg, Class A, 1.84 yield
Tail Cement	500 sacks of 15.6 ppg, Class A, 1.84 yield
Cement Volume to Surface	150 bbls
Number of Centralizers	19

Cementing Summary - Protection Casing

Casing Size & Specifications	9 5/8”, 36 lb/ft, J-55, LTC
Date Cemented	9/29/2022
Casing Setting Depth	3,277 ft KB
Hole Diameter	12 1/4”
Pre-flush	40 bbls
Lead Cement	471 sacks of 13.1 ppg, Class A, 1.84 yield
Tail Cement	613 sacks of 15.6 ppg, Class A, 1.18 yield
Cement Volume to Surface	79 bbls
Number of Centralizers	26

TABLE 5
LOG SUMMARY, NCL IW-2

Log Vendor	Log Run Number	Log Title	Date Run	Depth Interval (MD ft. KB)
Schlumberger	1A	Power Position Caliper, 4 Arm Caliper, Gamma Ray, Relative Bearing	9/16/22	104 - 1,534
Schlumberger	1A	Platform Express, Hi-Res Litholog -Density, Hi Res Neutron, GR, Cali	9/16/22	104 - 1,534
Schlumberger	1A	Platfrom Express, Array Induction, Resistivity, GR, Caliper	9/16/22	10 - 1,534
Schlumberger	1A	Platform Express, Triple Combo, Litho-Density, Neutron, Resistivity, GR	9/16/22	10 - 1,534
Schlumberger	2A	Digital Sonic, Cement Bond, Variable Density, GR, CCL	9/18/22	10 - 1,470
Schlumberger	3D1	Platfrom Express, HIRES Litho-Density, HiRes Neutron, GR, Caliper	9/28/22	1,000 - 3,280
Schlumberger	3D1	Platform Express, Array Induction Tool, Resisitivity, GR, Caliper	9/28/22	1,000 - 3,280
Schlumberger	3D1	Platform Express, Triple Combo, Litho-Density, Neutron, Resistivity, GR, Caliper	9/28/22	1,000 - 3,280
Schlumberger	3D2	Power Position Caliper, 4 Arm Caliper, Gamma Ray, Relative Bearing	9/28/22	1,529 - 3,280
Schlumberger	3D2	FMI Processed Images & Dip Interpretation 1:20 Scale	9/28/22	1,532 - 3,260
Schlumberger	3D2	FMI Processed Images & Dip Interpretation 1:240 Scale	9/28/22	1,532 - 3,260
Schlumberger	4D1	UltraSonic Imager, Casing Integrity, GR - CCL	10/2/22	25 - 3,075
Schlumberger	4D1	Ultrasonic Imager, Cement Evaluation, GR - CCL	10/2/22	25 - 3,075
Schlumberger	4D1	Digital Sonic, Cement Bond, Variable Density, GR - CCL	10/2/22	25 - 3,075
Schlumberger	4D1	Ultrasonic Imager, Cement Evaluation (Short) GR - CCL	10/2/22	25 - 3,075
Schlumberger	one	XL Rock, Gamma Ray	10/9/22	3,324 - 5,207
Schlumberger	ONE	Natural Gamma Ray Spectroscopy	10/12/22	3,277 - 5,205
Schlumberger	ONE	Platfrom Express, HiRes Laterolog Array, GR	12/12/22	3,277 - 5,205
Schlumberger	ONE	Platform Express, Triple Combo	10/12/22	3,277 - 5,205
Schlumberger	ONE	Compressional and Sheer Delta T Computations	10/12/22	3,275 - 5,180
Schlumberger	ONE	UltraSonic Imager, Casing Integrity, GR - CCL	10/12/22	50 - 3,250
Schlumberger	ONE	Ultrasoinc Imager, Cement Evaluation, Gamma Ray - CCL	10/12/22	50 - 3,250
Schlumberger	ONE	Ultrasonic Imager, Cement Evaluation (short) Gamma Ray - CCL	10/12/22	50 - 3,250
Schlumberger	ONE	Integrated Petrophysical Analysis Quanti.Elan	10/13/22	3,300 - 5,180
Schlumberger	One	Gamma Ray, Borehole Compensated Sonic	10/13/22	3,277 - 5,207
Schlumberger	One	Cement Bond Log, Variable Density Log, Gamma Ray	10/13/22	3,277 - 5,615
Schlumberger	ONE	Combinalbe Magnetic Resonance, Gamma Ray **Field Print**	10/13/22	3,277 - 5,205
Michigan Wireline	1	Differential Temperature Log	12/28/22	0 - 5,186
Michigan Wireline	2	Radioactive Tracer Log	12/29/22	0 - 5,186

FIGURES

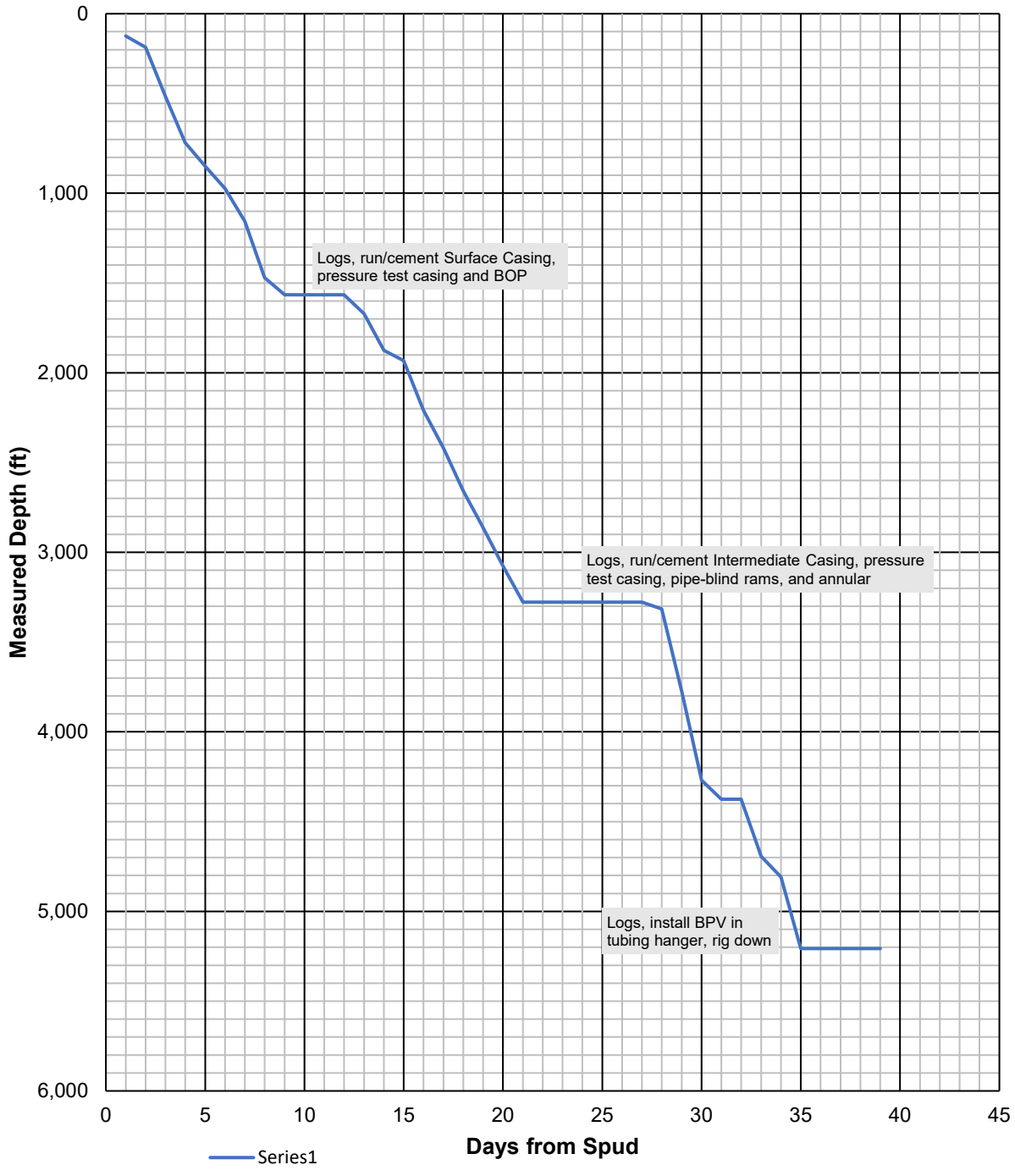
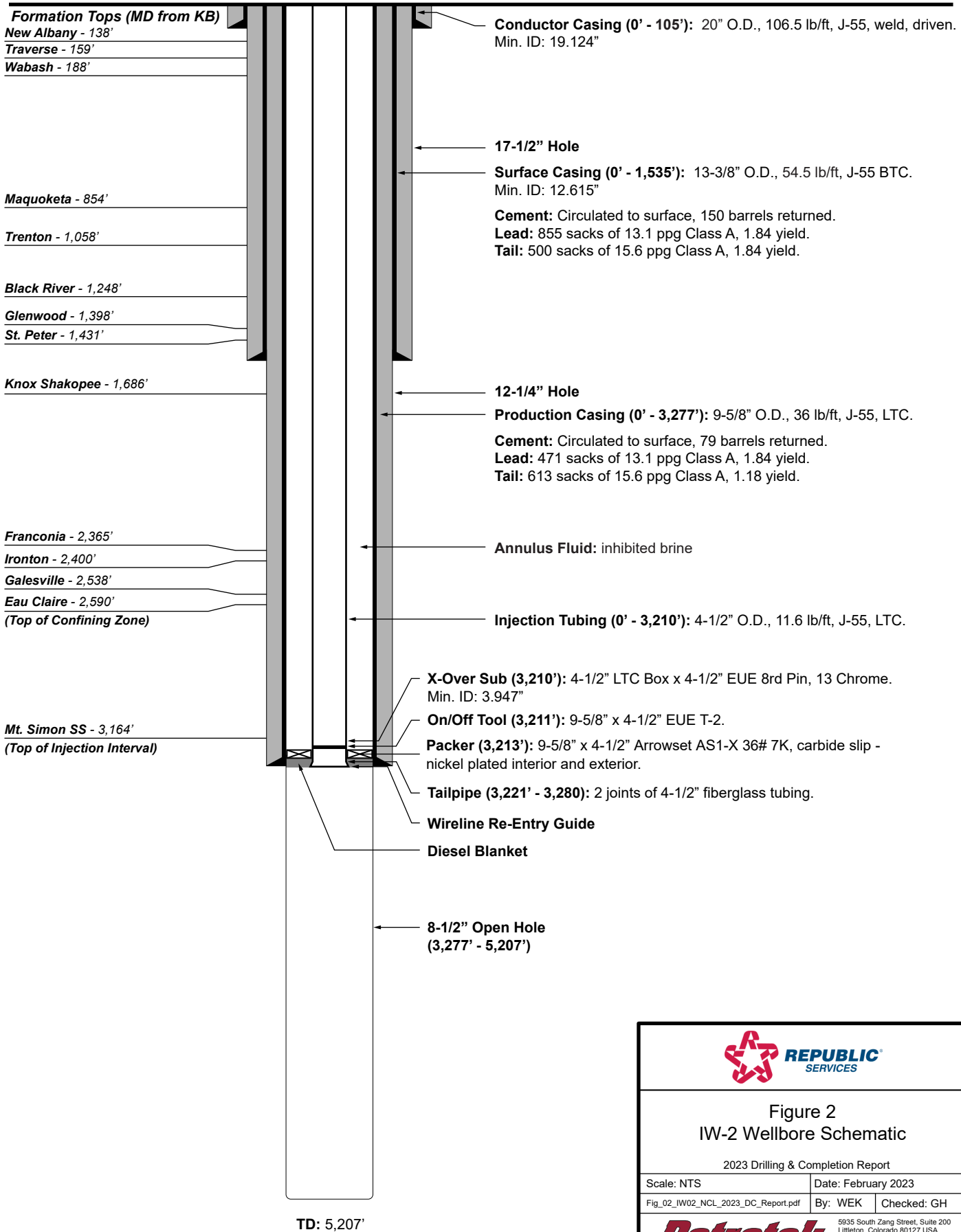


Figure 1. Days vs. Depth Drilling Curve

US EPA Permit: IN-111-1I-0002
API: 21-139-62002-70-00
Newton County, Indiana
NE, Sec. 28, T29N, R08W
Lat: 40.939767° / Long: -87.338797° (NAD 83)

Note: All measurements are TVD from Kelly Bushing (KB), 17 feet above ground surface.
KB Elevation: 721' AMSL
GL Elevation: 704' AMSL



NOT TO SCALE

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Figure 2
IW-2 Wellbore Schematic

2023 Drilling & Completion Report

Scale: NTS	Date: February 2023	
Fig_02_IW02_NCL_2023_DC_Report.pdf	By: WEK	Checked: GH

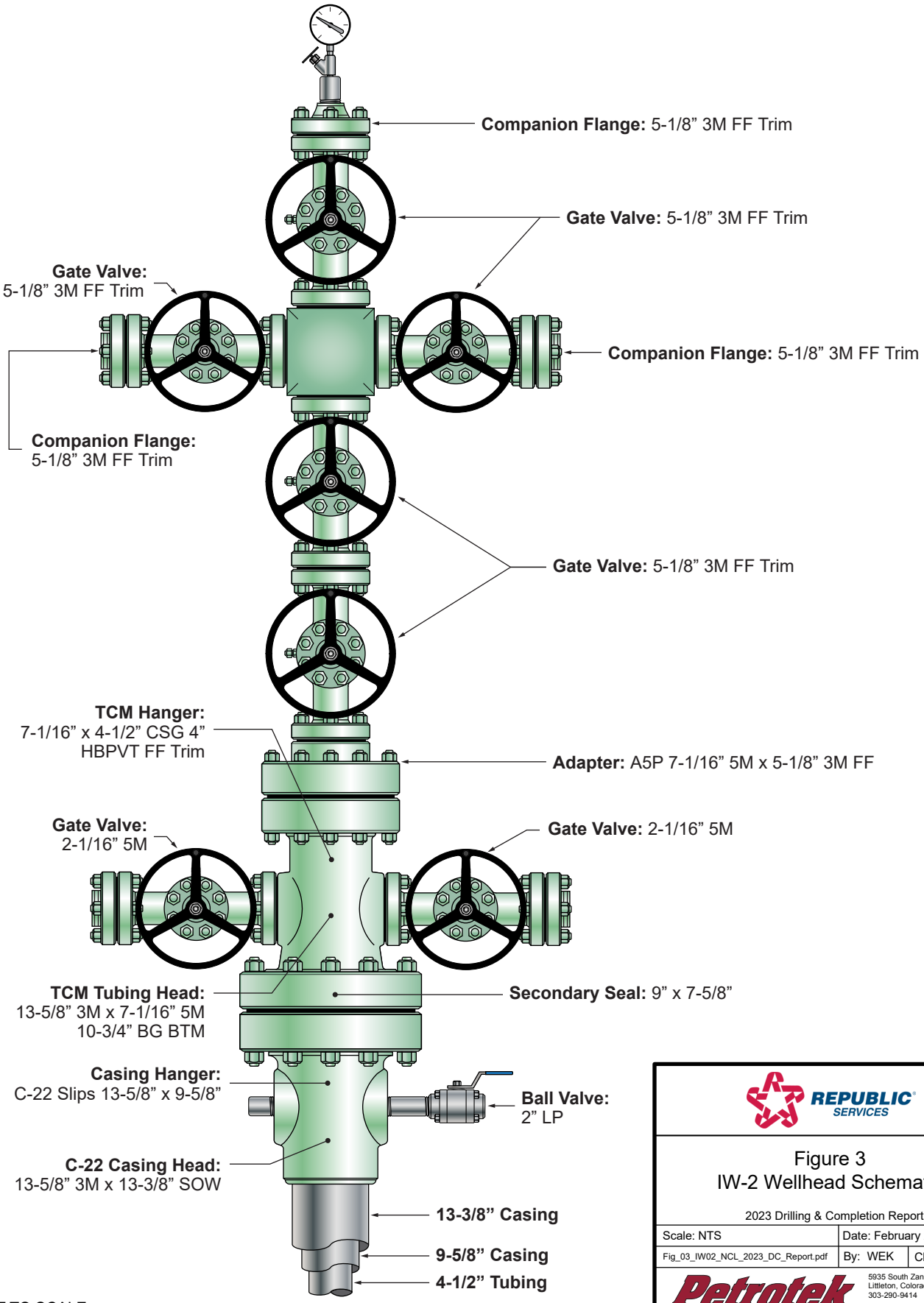
Petrotek
5935 South Zang Street, Suite 200
Littleton, Colorado 80127 USA
303-290-9414
www.petrotek.com

US EPA Permit: IN-111-1I-0002

Newton County, Indiana

NE, Sec. 28, T29N, R08W

Lat: 40.927933° / Long: -87.334683° (NAD 83)



NOT TO SCALE

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Figure 3
IW-2 Wellhead Schematic

2023 Drilling & Completion Report

Scale: NTS	Date: February 2023	
Fig_03_IW02_NCL_2023_DC_Report.pdf	By: WEK	Checked: GH

Petrotek
5935 South Zang Street, Suite 200
Littleton, Colorado 80127 USA
303-290-9414
www.petrotek.com

Pages 37 to 88 of the original report (51 pages) have been redacted under FOIA Exemption 9, Geological or geophysical information and data concerning wells; information of technical or scientific nature.

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Josh McGarry
Republic Services Inc
2400 S. Loomis Street
Chicago, Illinois 60608

Generated 1/9/2023 9:08:22 AM

JOB DESCRIPTION

IW-2

JOB NUMBER

500-226999-1

Eurofins Chicago
2417 Bond Street
University Park IL 60484

See page two for job notes and contact information.

Job Notes

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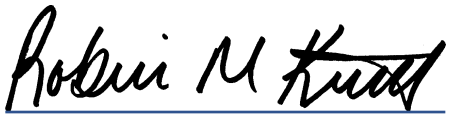
Authorization



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Authorized for release by
Robin Kintz, Project Manager II
Robin.Kintz@et.eurofinsus.com
(708)534-5200

Table of Contents

Job ID: 500-226999-1

Laboratory: Eurofins Chicago

Narrative

Job Narrative
500-226999-1

Comments
No additional comments.

Receipt
The sample was received on 12/16/2022 2:43 PM. Unless otherwise noted below, the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 4.9º C.

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA
Method 8270D: The continuing calibration verification (CCV) analyzed in batch 500-691208 was outside the method criteria for the following analyte(s): Pentachlorophenol. A CCV standard at or below the reporting limit (RL) was analyzed with the affected samples and found to be acceptable. As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analyte(s) is considered estimated.

Method 8270D: The continuing calibration verification (CCV) analyzed in 500-691208 was outside the method criteria for the following analyte(s): 2-Fluorophenol (Surr) and Phenol-d5 (Surr). As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analyte(s) is considered estimated.

Method 8270D: The continuing calibration verification (CCV) analyzed in batch 500-691560 was outside the method criteria for the following analyte(s): Hexachlorocyclopentadiene and 2,2'-oxybis[1-chloropropane]. A CCV standard at or below the reporting limit (RL) was analyzed with the affected samples and found to be acceptable. As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analyte(s) is considered estimated.

Method 8270D: The continuing calibration verification (CCV) analyzed in 500-691560 was outside the method criteria for the following analyte(s): Hexachlorobenzene, Hexachlorobutadiene, 2,4,6-Trichlorophenol and 2,4,6-Tribromophenol (Surr). As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analyte(s) is considered estimated.

Method 8270D: Perylene-d12 Internal standard (ISTD) response for the following sample was outside of acceptance limits: IW-2 (500-226999-1). This internal standard is not associated to the reported analytes; therefore, re-analysis was not performed.

Method 8270D: The following sample was diluted due to the nature of the sample matrix: IW-2 (500-226999-1). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA
Method 8081B: The laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for preparation batch 500-690663 and analytical batch 500-690841 recovered outside control limits for the following analyte: Methoxychlor. This analyte was biased high in the LCS and LCSD and were not detected in the associated sample; therefore, the data have been reported.

Method 8081B: Surrogate recovery for the following sample was outside control limits: IW-2 (500-226999-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Method 8151A: Surrogate recovery for the following sample was outside the upper control limit: IW-2 (500-226999-1). This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
Method 6020B: Due to sample matrix effect on the internal standard (ISTD), a dilution was required for the following sample: IW-2

Job ID: 500-226999-1 (Continued)

Laboratory: Eurofins Chicago (Continued)

(500-226999-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
Method 9012B: The reference method requires samples to be preserved to a pH of >12. The following sample was received with insufficient preservation at a pH of <12: IW-2 (500-226999-1). The sample(s) was preserved to the appropriate pH in the laboratory.

Method SM 4500 NH3 G: Due to the high concentration of Ammonia, the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 500-691778 and analytical batch 500-691875 could not be evaluated for accuracy and precision. The associated laboratory control sample (LCS) met acceptance criteria.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Client Sample ID: IW-2

Lab Sample ID: 500-226999-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.0027		0.00050	0.00015	mg/L	1		8260B	Total/NA
Chlorobenzene	0.00077	J	0.0010	0.00039	mg/L	1		8260B	Total/NA
1,4-Dichlorobenzene	0.00068	J	0.0010	0.00036	mg/L	1		8260B	Total/NA
Tetrachloroethene	0.00088	J	0.0010	0.00037	mg/L	1		8260B	Total/NA
Arsenic	0.017		0.0050	0.0012	mg/L	5		6020B	Total Recoverable
Barium	0.19		0.013	0.0037	mg/L	5		6020B	Total Recoverable
Chromium	0.27		0.025	0.0057	mg/L	5		6020B	Total Recoverable
Lead	0.20		0.0025	0.00093	mg/L	5		6020B	Total Recoverable
Selenium	0.023		0.013	0.0049	mg/L	5		6020B	Total Recoverable
Potassium	580		2.5	0.56	mg/L	5		6020B	Total Recoverable
Sodium	20000		40	15	mg/L	200		6020B	Total Recoverable
Ignitablity (Flashpoint)	>200				Degrees F	1		1010B	Total/NA
Sulfide	0.55	J	1.0	0.23	mg/L	1		9034	Total/NA
Total Organic Carbon	180		10	3.5	mg/L	10		9060A	Total/NA
Total Inorganic Nitrogen	11		0.20	0.20	mg/L	1		Inorganic N	Total/NA
Total Dissolved Solids	130000		5000	2200	mg/L	1		SM 2540C	Total/NA
Oxidation Reduction Potential	510	HF			millivolts	1		SM 2580B	Total/NA
Specific Gravity	1.0604				NONE	1		SM 2710F	Total/NA
Chloride	50000		4000	2000	mg/L	2000		SM 4500 Cl- E	Total/NA
Ammonia	11		2.0	1.0	mg/L	10		SM 4500 NH3 G	Total/NA

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	EET CHI
8270D	Semivolatile Organic Compounds (GC/MS)	SW846	EET CHI
8081B	Organochlorine Pesticides (GC)	SW846	EET CHI
8151A	Herbicides (GC)	SW846	EET CHI
6020B	Metals (ICP/MS)	SW846	EET CHI
7470A	Mercury (CVAA)	SW846	EET CHI
1010B	Ignitability, Pensky-Martens Closed-Cup Method	SW846	EET CF
9012B	Cyanide, Total andor Amenable	SW846	EET CF
9034	Sulfide, Acid soluble and Insoluble (Titrimetric)	SW846	EET CHI
9060A	Organic Carbon, Total (TOC)	SW846	EET CAN
Inorganic N	Nitrogen, Total Inorganic	EPA	EET CHI
N07-0003	Enzymatic Nitrate-Nitrite Nitrogen	EPA	EET CHI
SM 2320B	Alkalinity	SM	EET CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	EET CHI
SM 2580B	Reduction-Oxidation (REDOX) Potential	SM	EET CHI
SM 2710F	Specific Gravity, Density	SM	EET CHI
SM 4500 Cl- E	Chloride, Total	SM	EET CHI
SM 4500 NH3 G	Ammonia	SM	EET CHI
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	EET CHI
3510C	Liquid-Liquid Extraction (Separatory Funnel)	SW846	EET CHI
5030B	Purge and Trap	SW846	EET CHI
7470A	Preparation, Mercury	SW846	EET CHI
8151A	Extraction (Herbicides)	SW846	EET CHI
9012B	Cyanide, Total and/or Amenable, Distillation	SW846	EET CF
SM 4500 NH3 B	Distillation, Ammonia	SM	EET CHI

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

EET CHI = Eurofins Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-226999-1	IW-2	Water	12/16/22 12:45	12/16/22 14:43

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Client Sample ID: IW-2
Date Collected: 12/16/22 12:45
Date Received: 12/16/22 14:43

Lab Sample ID: 500-226999-1
Matrix: Water

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	**0.0027**		0.00050	0.00015	mg/L			12/28/22 13:26	1
Carbon tetrachloride	<0.0010		0.0010	0.00038	mg/L			12/28/22 13:26	1
Chlorobenzene	**0.00077**	**J**	0.0010	0.00039	mg/L			12/28/22 13:26	1
Chloroform	<0.0020		0.0020	0.00037	mg/L			12/28/22 13:26	1
1,4-Dichlorobenzene	**0.00068**	**J**	0.0010	0.00036	mg/L			12/28/22 13:26	1
1,2-Dichloroethane	<0.0010		0.0010	0.00039	mg/L			12/28/22 13:26	1
1,1-Dichloroethene	<0.0010		0.0010	0.00039	mg/L			12/28/22 13:26	1
Methyl Ethyl Ketone	<0.0050		0.0050	0.0021	mg/L			12/28/22 13:26	1
Tetrachloroethene	**0.00088**	**J**	0.0010	0.00037	mg/L			12/28/22 13:26	1
Trichloroethene	<0.00050		0.00050	0.00016	mg/L			12/28/22 13:26	1
Vinyl chloride	<0.0010		0.0010	0.00020	mg/L			12/28/22 13:26	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*81*		*72 - 124*		*12/28/22 13:26*	*1*
Dibromofluoromethane (Surr)	*106*		*75 - 120*		*12/28/22 13:26*	*1*
1,2-Dichloroethane-d4 (Surr)	*108*		*75 - 126*		*12/28/22 13:26*	*1*
Toluene-d8 (Surr)	*98*		*75 - 120*		*12/28/22 13:26*	*1*

Method: SW846 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
o-Cresol	<0.0064		0.0064	0.00098	mg/L		12/21/22 08:08	12/28/22 17:23	5
m & p - Cresol	<0.0064		0.0064	0.0014	mg/L		12/21/22 08:08	12/28/22 17:23	5
2,4-Dinitrotoluene	<0.0032		0.0032	0.00079	mg/L		12/21/22 08:08	12/28/22 17:23	5
Hexachlorobenzene	<0.0016		0.0016	0.00026	mg/L		12/21/22 08:08	12/28/22 17:23	5
Hexachlorobutadiene	<0.016		0.016	0.0017	mg/L		12/21/22 08:08	12/28/22 17:23	5
Hexachloroethane	<0.016		0.016	0.0019	mg/L		12/21/22 08:08	12/28/22 17:23	5
Nitrobenzene	<0.0032		0.0032	0.0014	mg/L		12/21/22 08:08	12/28/22 17:23	5
Pentachlorophenol	<0.064		0.064	0.013	mg/L		12/21/22 08:08	12/28/22 17:23	5
Pyridine	<0.064		0.064	0.016	mg/L		12/21/22 08:08	12/28/22 17:23	5
2,4,5-Trichlorophenol	<0.032		0.032	0.0083	mg/L		12/21/22 08:08	12/28/22 17:23	5
2,4,6-Trichlorophenol	<0.016		0.016	0.0023	mg/L		12/21/22 08:08	12/28/22 17:23	5
Cresols (total)	<0.0064		0.0064	0.00088	mg/L		12/21/22 08:08	12/28/22 17:23	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*89*		*27 - 110*	*12/21/22 08:08*	*12/28/22 17:23*	*5*
Phenol-d5 (Surr)	*71*		*20 - 110*	*12/21/22 08:08*	*12/28/22 17:23*	*5*
Nitrobenzene-d5 (Surr)	*58*		*36 - 120*	*12/21/22 08:08*	*12/28/22 17:23*	*5*
2-Fluorobiphenyl (Surr)	*59*		*34 - 110*	*12/21/22 08:08*	*12/28/22 17:23*	*5*
2,4,6-Tribromophenol (Surr)	*119*		*40 - 145*	*12/21/22 08:08*	*12/28/22 17:23*	*5*
Terphenyl-d14 (Surr)	*103*		*40 - 145*	*12/21/22 08:08*	*12/28/22 17:23*	*5*

Method: SW846 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlordane (technical)	<0.000066		0.000066	0.000066	mg/L		12/20/22 07:50	12/21/22 11:30	1
Endrin	<0.000033		0.000033	0.000022	mg/L		12/20/22 07:50	12/21/22 11:30	1
Heptachlor	<0.000033		0.000033	0.000028	mg/L		12/20/22 07:50	12/21/22 11:30	1
Heptachlor epoxide	<0.000033		0.000033	0.000025	mg/L		12/20/22 07:50	12/21/22 11:30	1
Lindane	<0.000033		0.000033	0.000027	mg/L		12/20/22 07:50	12/21/22 11:30	1
Methoxychlor	<0.000066	*+	0.000066	0.000054	mg/L		12/20/22 07:50	12/21/22 11:30	1
Toxaphene	<0.00033		0.00033	0.00032	mg/L		12/20/22 07:50	12/21/22 11:30	1

Client Sample ID: IW-2
Date Collected: 12/16/22 12:45
Date Received: 12/16/22 14:43

Lab Sample ID: 500-226999-1
Matrix: Water

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*25*	*S1-*	*30 - 130*	*12/20/22 07:50*	*12/21/22 11:30*	*1*
Tetrachloro-m-xylene	*39*		*30 - 120*	*12/20/22 07:50*	*12/21/22 11:30*	*1*

Method: SW846 8151A - Herbicides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	<0.0012		0.0012	0.00062	mg/L		12/20/22 07:56	12/21/22 15:53	1
Silvex (2,4,5-TP)	<0.0012		0.0012	0.00015	mg/L		12/20/22 07:56	12/21/22 15:53	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCAA	*195*	*S1+*	*25 - 130*	*12/20/22 07:56*	*12/21/22 15:53*	*1*

Method: SW846 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.017**		0.0050	0.0012	mg/L		12/28/22 08:58	01/03/23 19:55	5
Barium	**0.19**		0.013	0.0037	mg/L		12/28/22 08:58	01/03/23 15:44	5
Cadmium	<0.0025		0.0025	0.00084	mg/L		12/28/22 08:58	01/03/23 19:55	5
Chromium	**0.27**		0.025	0.0057	mg/L		12/28/22 08:58	01/03/23 15:44	5
Lead	**0.20**		0.0025	0.00093	mg/L		12/28/22 08:58	01/03/23 15:44	5
Selenium	**0.023**		0.013	0.0049	mg/L		12/28/22 08:58	01/03/23 15:44	5
Silver	<0.0025		0.0025	0.00058	mg/L		12/28/22 08:58	01/03/23 19:55	5
Potassium	**580**		2.5	0.56	mg/L		12/28/22 08:58	01/03/23 15:44	5
Sodium	**20000**		40	15	mg/L		12/28/22 08:58	01/04/23 12:45	200

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.20		0.20	0.098	ug/L		12/27/22 12:05	12/28/22 07:21	1

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Ignitablity (Flashpoint) (SW846 1010B)	**>200**				Degrees F			12/31/22 09:30	1
Oxidation Reduction Potential (SM 2580B)	**510**	**HF**			millivolts			01/04/23 10:30	1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total (SW846 9012B)	<0.010		0.010	0.0043	mg/L		12/27/22 09:14	12/28/22 21:28	1
Sulfide (SW846 9034)	**0.55**	**J**	1.0	0.23	mg/L			12/19/22 07:05	1
Total Organic Carbon (SW846 9060A)	**180**		10	3.5	mg/L			12/29/22 06:29	10
Total Inorganic Nitrogen (EPA Inorganic N)	**11**		0.20	0.20	mg/L			01/06/23 17:31	1
Nitrate Nitrite as N (EPA N07-0003)	<0.10		0.10	0.041	mg/L			01/03/23 09:46	1
Total Alkalinity as CaCO3 to pH 4.5 (SM 2320B)	<5.0		5.0	2.3	mg/L			12/21/22 11:39	1
Total Dissolved Solids (SM 2540C)	**130000**		5000	2200	mg/L			12/20/22 04:00	1
Specific Gravity (SM 2710F)	**1.0604**				NONE			01/03/23 16:14	1
Chloride (SM 4500 Cl- E)	**50000**		4000	2000	mg/L			12/19/22 11:38	2000
Ammonia (SM 4500 NH3 G)	**11**		2.0	1.0	mg/L		12/29/22 11:24	12/29/22 14:26	10

Definitions/Glossary

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
S1-	Surrogate recovery exceeds control limits, low biased.
S1+	Surrogate recovery exceeds control limits, high biased.

General Chemistry

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

QC Association Summary

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

GC/MS VOA

Analysis Batch: 691491

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	8260B	
MB 500-691491/8	Method Blank	Total/NA	Water	8260B	
LCS 500-691491/5	Lab Control Sample	Total/NA	Water	8260B	

GC/MS Semi VOA

Prep Batch: 690848

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	3510C	
MB 500-690848/1-A	Method Blank	Total/NA	Water	3510C	
LCS 500-690848/2-A	Lab Control Sample	Total/NA	Water	3510C	

Analysis Batch: 691384

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 500-690848/1-A	Method Blank	Total/NA	Water	8270D	690848
LCS 500-690848/2-A	Lab Control Sample	Total/NA	Water	8270D	690848

Analysis Batch: 691560

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	8270D	690848

GC Semi VOA

Prep Batch: 690663

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	3510C	
MB 500-690663/1-A	Method Blank	Total/NA	Water	3510C	
LCS 500-690663/2-A	Lab Control Sample	Total/NA	Water	3510C	
LCSD 500-690663/3-A	Lab Control Sample Dup	Total/NA	Water	3510C	

Prep Batch: 690666

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	8151A	
MB 500-690666/1-A	Method Blank	Total/NA	Water	8151A	
LCS 500-690666/2-A	Lab Control Sample	Total/NA	Water	8151A	
LCSD 500-690666/3-A	Lab Control Sample Dup	Total/NA	Water	8151A	

Analysis Batch: 690841

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	8081B	690663
MB 500-690663/1-A	Method Blank	Total/NA	Water	8081B	690663
LCS 500-690663/2-A	Lab Control Sample	Total/NA	Water	8081B	690663
LCSD 500-690663/3-A	Lab Control Sample Dup	Total/NA	Water	8081B	690663

Analysis Batch: 690962

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	8151A	690666
MB 500-690666/1-A	Method Blank	Total/NA	Water	8151A	690666
LCS 500-690666/2-A	Lab Control Sample	Total/NA	Water	8151A	690666
LCSD 500-690666/3-A	Lab Control Sample Dup	Total/NA	Water	8151A	690666

Metals

Prep Batch: 691402

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	7470A	
MB 500-691402/12-A	Method Blank	Total/NA	Water	7470A	
LCS 500-691402/13-A	Lab Control Sample	Total/NA	Water	7470A	

Prep Batch: 691542

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total Recoverable	Water	3005A	
MB 500-691542/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 500-691542/2-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 691594

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	7470A	691402
MB 500-691402/12-A	Method Blank	Total/NA	Water	7470A	691402
LCS 500-691402/13-A	Lab Control Sample	Total/NA	Water	7470A	691402

Analysis Batch: 692336

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total Recoverable	Water	6020B	691542
MB 500-691542/1-A	Method Blank	Total Recoverable	Water	6020B	691542
LCS 500-691542/2-A	Lab Control Sample	Total Recoverable	Water	6020B	691542

Analysis Batch: 692437

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total Recoverable	Water	6020B	691542
MB 500-691542/1-A	Method Blank	Total Recoverable	Water	6020B	691542
LCS 500-691542/2-A	Lab Control Sample	Total Recoverable	Water	6020B	691542

Analysis Batch: 692473

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total Recoverable	Water	6020B	691542

General Chemistry

Analysis Batch: 375456

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	SM 2320B	
MB 310-375456/2	Method Blank	Total/NA	Water	SM 2320B	
LCS 310-375456/3	Lab Control Sample	Total/NA	Water	SM 2320B	

Prep Batch: 375572

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	9012B	
MB 310-375572/1-A	Method Blank	Total/NA	Water	9012B	
LCS 310-375572/2-A	Lab Control Sample	Total/NA	Water	9012B	

Analysis Batch: 375727

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	9012B	375572
MB 310-375572/1-A	Method Blank	Total/NA	Water	9012B	375572
LCS 310-375572/2-A	Lab Control Sample	Total/NA	Water	9012B	375572

General Chemistry

Analysis Batch: 375910

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	1010B	
LCS 310-375910/1	Lab Control Sample	Total/NA	Water	1010B	
500-226999-1 DU	IW-2	Total/NA	Water	1010B	

Analysis Batch: 557515

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	9060A	
MB 240-557515/34	Method Blank	Total/NA	Water	9060A	
MB 240-557515/4	Method Blank	Total/NA	Water	9060A	
LCS 240-557515/35	Lab Control Sample	Total/NA	Water	9060A	
LCS 240-557515/5	Lab Control Sample	Total/NA	Water	9060A	

Analysis Batch: 690414

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	9034	
MB 500-690414/1	Method Blank	Total/NA	Water	9034	
LCS 500-690414/2	Lab Control Sample	Total/NA	Water	9034	
500-226999-1 MS	IW-2	Total/NA	Water	9034	
500-226999-1 MSD	IW-2	Total/NA	Water	9034	

Analysis Batch: 690528

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	SM 4500 Cl- E	
MB 500-690528/51	Method Blank	Total/NA	Water	SM 4500 Cl- E	
LCS 500-690528/52	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	

Analysis Batch: 690631

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	SM 2540C	
MB 500-690631/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 500-690631/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Prep Batch: 691778

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	SM 4500 NH3 B	
MB 500-691778/1-A	Method Blank	Total/NA	Water	SM 4500 NH3 B	
LCS 500-691778/2-A	Lab Control Sample	Total/NA	Water	SM 4500 NH3 B	
500-226999-1 MS	IW-2	Total/NA	Water	SM 4500 NH3 B	
500-226999-1 MSD	IW-2	Total/NA	Water	SM 4500 NH3 B	

Analysis Batch: 691875

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	SM 4500 NH3 G	691778
MB 500-691778/1-A	Method Blank	Total/NA	Water	SM 4500 NH3 G	691778
LCS 500-691778/2-A	Lab Control Sample	Total/NA	Water	SM 4500 NH3 G	691778
500-226999-1 MS	IW-2	Total/NA	Water	SM 4500 NH3 G	691778
500-226999-1 MSD	IW-2	Total/NA	Water	SM 4500 NH3 G	691778

Analysis Batch: 692250

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	N07-0003	

General Chemistry (Continued)

Analysis Batch: 692250 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 500-692250/13	Method Blank	Total/NA	Water	N07-0003	
LCS 500-692250/14	Lab Control Sample	Total/NA	Water	N07-0003	

Analysis Batch: 692309

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	SM 2710F	

Analysis Batch: 692433

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	SM 2580B	

Analysis Batch: 692907

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-226999-1	IW-2	Total/NA	Water	Inorganic N	

Surrogate Summary

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water — **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	DCA	TOL
Lab Sample ID	Client Sample ID	(72-124)	(75-120)	(75-126)	(75-120)
500-226999-1	IW-2	81	106	108	98
LCS 500-691491/5	Lab Control Sample	84	102	101	99
MB 500-691491/8	Method Blank	85	110	109	94

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)
DCA = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Matrix: Water — **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)					
		2FP	PHL	NBZ	FBP	TBP	TPHL
Lab Sample ID	Client Sample ID	(27-110)	(20-110)	(36-120)	(34-110)	(40-145)	(40-145)
500-226999-1	IW-2	89	71	58	59	119	103
LCS 500-690848/2-A	Lab Control Sample	74	63	81	80	116	110
MB 500-690848/1-A	Method Blank	65	40	60	61	75	99

Surrogate Legend

2FP = 2-Fluorophenol (Surr)
PHL = Phenol-d5 (Surr)
NBZ = Nitrobenzene-d5 (Surr)
FBP = 2-Fluorobiphenyl (Surr)
TBP = 2,4,6-Tribromophenol (Surr)
TPHL = Terphenyl-d14 (Surr)

Method: 8081B - Organochlorine Pesticides (GC)

Matrix: Water — **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
		DCBP1	TCX1
Lab Sample ID	Client Sample ID	(30-130)	(30-120)
500-226999-1	IW-2	25 S1-	39
LCS 500-690663/2-A	Lab Control Sample	76	78
LCSD 500-690663/3-A	Lab Control Sample Dup	70	67
MB 500-690663/1-A	Method Blank	78	66

Surrogate Legend

DCBP = DCB Decachlorobiphenyl
TCX = Tetrachloro-m-xylene

Method: 8151A - Herbicides (GC)

Matrix: Water — **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
		DCPAA2
Lab Sample ID	Client Sample ID	(25-130)
500-226999-1	IW-2	195 S1+
LCS 500-690666/2-A	Lab Control Sample	80
LCSD 500-690666/3-A	Lab Control Sample Dup	86

Surrogate Summary

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Method: 8151A - Herbicides (GC) (Continued)

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)								
Lab Sample ID	**Client Sample ID**	**DCPAA2 (25-130)**								
MB 500-690666/1-A	Method Blank	90								

Surrogate Legend

DCPAA = DCAA

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-691491/8
Matrix: Water
Analysis Batch: 691491

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	<0.00050		0.00050	0.00015	mg/L			12/28/22 11:08	1
Carbon tetrachloride	<0.0010		0.0010	0.00038	mg/L			12/28/22 11:08	1
Chlorobenzene	<0.0010		0.0010	0.00039	mg/L			12/28/22 11:08	1
Chloroform	<0.0020		0.0020	0.00037	mg/L			12/28/22 11:08	1
1,4-Dichlorobenzene	<0.0010		0.0010	0.00036	mg/L			12/28/22 11:08	1
1,2-Dichloroethane	<0.0010		0.0010	0.00039	mg/L			12/28/22 11:08	1
1,1-Dichloroethene	<0.0010		0.0010	0.00039	mg/L			12/28/22 11:08	1
Methyl Ethyl Ketone	<0.0050		0.0050	0.0021	mg/L			12/28/22 11:08	1
Tetrachloroethene	<0.0010		0.0010	0.00037	mg/L			12/28/22 11:08	1
Trichloroethene	<0.00050		0.00050	0.00016	mg/L			12/28/22 11:08	1
Vinyl chloride	<0.0010		0.0010	0.00020	mg/L			12/28/22 11:08	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*85*		*72 - 124*		*12/28/22 11:08*	*1*
Dibromofluoromethane (Surr)	*110*		*75 - 120*		*12/28/22 11:08*	*1*
1,2-Dichloroethane-d4 (Surr)	*109*		*75 - 126*		*12/28/22 11:08*	*1*
Toluene-d8 (Surr)	*94*		*75 - 120*		*12/28/22 11:08*	*1*

Lab Sample ID: LCS 500-691491/5
Matrix: Water
Analysis Batch: 691491

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Benzene	0.0500	0.0485		mg/L		97	70 - 120
Carbon tetrachloride	0.0500	0.0567		mg/L		113	59 - 133
Chlorobenzene	0.0500	0.0490		mg/L		98	70 - 120
Chloroform	0.0500	0.0493		mg/L		99	70 - 120
1,4-Dichlorobenzene	0.0500	0.0467		mg/L		93	70 - 120
1,2-Dichloroethane	0.0500	0.0508		mg/L		102	68 - 127
1,1-Dichloroethene	0.0500	0.0502		mg/L		100	67 - 122
Methyl Ethyl Ketone	0.0500	0.0537		mg/L		107	46 - 144
Tetrachloroethene	0.0500	0.0530		mg/L		106	70 - 128
Trichloroethene	0.0500	0.0482		mg/L		96	70 - 125
Vinyl chloride	0.0500	0.0438		mg/L		88	64 - 126

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*84*		*72 - 124*
Dibromofluoromethane (Surr)	*102*		*75 - 120*
1,2-Dichloroethane-d4 (Surr)	*101*		*75 - 126*
Toluene-d8 (Surr)	*99*		*75 - 120*

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-690848/1-A
Matrix: Water
Analysis Batch: 691384

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 690848

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
o-Cresol	<0.0016		0.0016	0.00024	mg/L		12/21/22 08:08	12/27/22 12:54	1
m & p - Cresol	<0.0016		0.0016	0.00036	mg/L		12/21/22 08:08	12/27/22 12:54	1
2,4-Dinitrotoluene	<0.00080		0.00080	0.00020	mg/L		12/21/22 08:08	12/27/22 12:54	1
Hexachlorobenzene	<0.00040		0.00040	0.000064	mg/L		12/21/22 08:08	12/27/22 12:54	1
Hexachlorobutadiene	<0.0040		0.0040	0.00041	mg/L		12/21/22 08:08	12/27/22 12:54	1
Hexachloroethane	<0.0040		0.0040	0.00048	mg/L		12/21/22 08:08	12/27/22 12:54	1
Nitrobenzene	<0.00080		0.00080	0.00036	mg/L		12/21/22 08:08	12/27/22 12:54	1
Pentachlorophenol	<0.016		0.016	0.0032	mg/L		12/21/22 08:08	12/27/22 12:54	1
Pyridine	<0.016		0.016	0.0040	mg/L		12/21/22 08:08	12/27/22 12:54	1
2,4,5-Trichlorophenol	<0.0080		0.0080	0.0021	mg/L		12/21/22 08:08	12/27/22 12:54	1
2,4,6-Trichlorophenol	<0.0040		0.0040	0.00057	mg/L		12/21/22 08:08	12/27/22 12:54	1
Cresols (total)	<0.0016		0.0016	0.00022	mg/L		12/21/22 08:08	12/27/22 12:54	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*65*		*27 - 110*	*12/21/22 08:08*	*12/27/22 12:54*	*1*
Phenol-d5 (Surr)	*40*		*20 - 110*	*12/21/22 08:08*	*12/27/22 12:54*	*1*
Nitrobenzene-d5 (Surr)	*60*		*36 - 120*	*12/21/22 08:08*	*12/27/22 12:54*	*1*
2-Fluorobiphenyl (Surr)	*61*		*34 - 110*	*12/21/22 08:08*	*12/27/22 12:54*	*1*
2,4,6-Tribromophenol (Surr)	*75*		*40 - 145*	*12/21/22 08:08*	*12/27/22 12:54*	*1*
Terphenyl-d14 (Surr)	*99*		*40 - 145*	*12/21/22 08:08*	*12/27/22 12:54*	*1*

Lab Sample ID: LCS 500-690848/2-A
Matrix: Water
Analysis Batch: 691384

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 690848

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
o-Cresol	0.0320	0.0251		mg/L		78	53 - 115
m & p - Cresol	0.0320	0.0268		mg/L		84	50 - 116
2,4-Dinitrotoluene	0.0320	0.0320		mg/L		100	63 - 129
Hexachlorobenzene	0.0320	0.0296		mg/L		92	61 - 126
Hexachlorobutadiene	0.0320	0.0171		mg/L		53	20 - 100
Hexachloroethane	0.0320	0.0166		mg/L		52	20 - 100
Nitrobenzene	0.0320	0.0265		mg/L		83	54 - 121
Pentachlorophenol	0.0640	0.0625		mg/L		98	42 - 148
Pyridine	0.0640	0.0312		mg/L		49	15 - 110
2,4,5-Trichlorophenol	0.0320	0.0310		mg/L		97	63 - 124
2,4,6-Trichlorophenol	0.0320	0.0307		mg/L		96	62 - 121

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorophenol (Surr)	*74*		*27 - 110*
Phenol-d5 (Surr)	*63*		*20 - 110*
Nitrobenzene-d5 (Surr)	*81*		*36 - 120*
2-Fluorobiphenyl (Surr)	*80*		*34 - 110*
2,4,6-Tribromophenol (Surr)	*116*		*40 - 145*
Terphenyl-d14 (Surr)	*110*		*40 - 145*

Method: 8081B - Organochlorine Pesticides (GC)

Lab Sample ID: MB 500-690663/1-A
Matrix: Water
Analysis Batch: 690841

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 690663

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlordane (technical)	<0.000080		0.000080	0.000080	mg/L		12/20/22 07:50	12/21/22 09:54	1
Endrin	<0.000040		0.000040	0.000027	mg/L		12/20/22 07:50	12/21/22 09:54	1
Heptachlor	<0.000040		0.000040	0.000035	mg/L		12/20/22 07:50	12/21/22 09:54	1
Heptachlor epoxide	<0.000040		0.000040	0.000030	mg/L		12/20/22 07:50	12/21/22 09:54	1
Lindane	<0.000040		0.000040	0.000033	mg/L		12/20/22 07:50	12/21/22 09:54	1
Methoxychlor	<0.000080		0.000080	0.000065	mg/L		12/20/22 07:50	12/21/22 09:54	1
Toxaphene	<0.00040		0.00040	0.00039	mg/L		12/20/22 07:50	12/21/22 09:54	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*78*		*30 - 130*	*12/20/22 07:50*	*12/21/22 09:54*	*1*
Tetrachloro-m-xylene	*66*		*30 - 120*	*12/20/22 07:50*	*12/21/22 09:54*	*1*

Lab Sample ID: LCS 500-690663/2-A
Matrix: Water
Analysis Batch: 690841

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 690663

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Endrin			0.000320	0.000369		mg/L		115	60 - 132		
Heptachlor			0.000320	0.000281		mg/L		88	40 - 120		
Heptachlor epoxide			0.000320	0.000349		mg/L		109	64 - 120		
Lindane			0.000320	0.000350		mg/L		109	68 - 120		
Methoxychlor			0.000320	0.000572	*+	mg/L		179	63 - 135		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
DCB Decachlorobiphenyl	*76*		*30 - 130*
Tetrachloro-m-xylene	*78*		*30 - 120*

Lab Sample ID: LCSD 500-690663/3-A
Matrix: Water
Analysis Batch: 690841

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 690663

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Endrin			0.000320	0.000334		mg/L		104	60 - 132	10	20
Heptachlor			0.000320	0.000272		mg/L		85	40 - 120	3	20
Heptachlor epoxide			0.000320	0.000318		mg/L		99	64 - 120	9	20
Lindane			0.000320	0.000313		mg/L		98	68 - 120	11	20
Methoxychlor			0.000320	0.000504	*+	mg/L		157	63 - 135	13	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
DCB Decachlorobiphenyl	*70*		*30 - 130*
Tetrachloro-m-xylene	*67*		*30 - 120*

Method: 8151A - Herbicides (GC)

Lab Sample ID: MB 500-690666/1-A
Matrix: Water
Analysis Batch: 690962

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 690666

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	<0.0010		0.0010	0.00054	mg/L		12/20/22 07:56	12/21/22 14:19	1
Silvex (2,4,5-TP)	<0.0010		0.0010	0.00013	mg/L		12/20/22 07:56	12/21/22 14:19	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCAA	*90*		*25 - 130*	*12/20/22 07:56*	*12/21/22 14:19*	*1*

Lab Sample ID: LCS 500-690666/2-A
Matrix: Water
Analysis Batch: 690962

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 690666

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
2,4-D			0.0101	0.00664		mg/L		66	30 - 115		
Silvex (2,4,5-TP)			0.00250	0.00170		mg/L		68	32 - 115		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
DCAA	*80*		*25 - 130*

Lab Sample ID: LCSD 500-690666/3-A
Matrix: Water
Analysis Batch: 690962

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 690666

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
2,4-D			0.0101	0.00740		mg/L		74	30 - 115	11	20
Silvex (2,4,5-TP)			0.00250	0.00185		mg/L		74	32 - 115	8	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
DCAA	*86*		*25 - 130*

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 500-691542/1-A
Matrix: Water
Analysis Batch: 692336

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 691542

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<0.0025		0.0025	0.00073	mg/L		12/28/22 08:58	01/03/23 15:37	1
Chromium	<0.0050		0.0050	0.0011	mg/L		12/28/22 08:58	01/03/23 15:37	1
Lead	<0.00050		0.00050	0.00019	mg/L		12/28/22 08:58	01/03/23 15:37	1
Selenium	<0.0025		0.0025	0.00098	mg/L		12/28/22 08:58	01/03/23 15:37	1
Potassium	<0.50		0.50	0.11	mg/L		12/28/22 08:58	01/03/23 15:37	1

Lab Sample ID: MB 500-691542/1-A
Matrix: Water
Analysis Batch: 692437

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 691542

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.0010		0.0010	0.00023	mg/L		12/28/22 08:58	01/03/23 19:37	1
Cadmium	<0.00050		0.00050	0.00017	mg/L		12/28/22 08:58	01/03/23 19:37	1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 500-691542/1-A
Matrix: Water
Analysis Batch: 692437

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 691542

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	<0.00050		0.00050	0.00012	mg/L		12/28/22 08:58	01/03/23 19:37	1
Sodium	<0.20		0.20	0.077	mg/L		12/28/22 08:58	01/03/23 19:37	1

Lab Sample ID: LCS 500-691542/2-A
Matrix: Water
Analysis Batch: 692336

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 691542

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Barium	0.500	0.497		mg/L		99	80 - 120
Chromium	0.200	0.201		mg/L		100	80 - 120
Lead	0.100	0.102		mg/L		102	80 - 120
Selenium	0.100	0.0989		mg/L		99	80 - 120
Potassium	10.0	10.2		mg/L		102	80 - 120

Lab Sample ID: LCS 500-691542/2-A
Matrix: Water
Analysis Batch: 692437

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 691542

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	0.100	0.0971		mg/L		97	80 - 120
Cadmium	0.0500	0.0520		mg/L		104	80 - 120
Silver	0.0500	0.0510		mg/L		102	80 - 120
Sodium	10.0	10.1		mg/L		101	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 500-691402/12-A
Matrix: Water
Analysis Batch: 691594

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 691402

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.20		0.20	0.098	ug/L		12/27/22 12:05	12/28/22 07:16	1

Lab Sample ID: LCS 500-691402/13-A
Matrix: Water
Analysis Batch: 691594

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 691402

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	1.98	1.91		ug/L		96	80 - 120

Method: 1010B - Ignitability, Pensky-Martens Closed-Cup Method

Lab Sample ID: LCS 310-375910/1
Matrix: Water
Analysis Batch: 375910

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ignitablity (Flashpoint)	81.0	82.6		Degrees F		102	94 - 109

Method: 1010B - Ignitability, Pensky-Martens Closed-Cup Method (Continued)

Lab Sample ID: 500-226999-1 DU
Matrix: Water
Analysis Batch: 375910

Client Sample ID: IW-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Ignitablity (Flashpoint)	>200		>200		Degrees F		NC	16

Method: 9012B - Cyanide, Total andor Amenable

Lab Sample ID: MB 310-375572/1-A
Matrix: Water
Analysis Batch: 375727

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 375572

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	<0.010		0.010	0.0043	mg/L		12/27/22 09:14	12/28/22 21:02	1

Lab Sample ID: LCS 310-375572/2-A
Matrix: Water
Analysis Batch: 375727

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 375572

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Cyanide, Total	0.200	0.185		mg/L		92	90 - 110

Method: 9034 - Sulfide, Acid soluble and Insoluble (Titrimetric)

Lab Sample ID: MB 500-690414/1
Matrix: Water
Analysis Batch: 690414

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	<1.0		1.0	0.23	mg/L			12/19/22 06:29	1

Lab Sample ID: LCS 500-690414/2
Matrix: Water
Analysis Batch: 690414

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Sulfide	3.97	3.95		mg/L		100	80 - 120

Lab Sample ID: 500-226999-1 MS
Matrix: Water
Analysis Batch: 690414

Client Sample ID: IW-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Sulfide	0.55	J	9.92	9.14		mg/L		87	75 - 125

Lab Sample ID: 500-226999-1 MSD
Matrix: Water
Analysis Batch: 690414

Client Sample ID: IW-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Sulfide	0.55	J	9.92	8.75		mg/L		83	75 - 125	4	20

Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 240-557515/34
Matrix: Water
Analysis Batch: 557515

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	<1.0		1.0	0.35	mg/L			12/29/22 06:09	1

Lab Sample ID: MB 240-557515/4
Matrix: Water
Analysis Batch: 557515

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	<1.0		1.0	0.35	mg/L			12/28/22 16:49	1

Lab Sample ID: LCS 240-557515/35
Matrix: Water
Analysis Batch: 557515

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	18.3	18.3		mg/L		100	85 - 115

Lab Sample ID: LCS 240-557515/5
Matrix: Water
Analysis Batch: 557515

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Organic Carbon	18.3	18.3		mg/L		100	85 - 115

Method: N07-0003 - Enzymatic Nitrate-Nitrite Nitrogen

Lab Sample ID: MB 500-692250/13
Matrix: Water
Analysis Batch: 692250

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate Nitrite as N	<0.10		0.10	0.041	mg/L			01/03/23 09:43	1

Lab Sample ID: LCS 500-692250/14
Matrix: Water
Analysis Batch: 692250

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Nitrate Nitrite as N	1.00	1.00		mg/L		100	90 - 110

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 310-375456/2
Matrix: Water
Analysis Batch: 375456

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Alkalinity as CaCO3 to pH 4.5	<5.0		5.0	2.3	mg/L			12/21/22 09:12	1

Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: LCS 310-375456/3
Matrix: Water
Analysis Batch: 375456

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Alkalinity as CaCO3 to pH 4.5	1000	1060		mg/L		106	90 - 110

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 500-690631/1
Matrix: Water
Analysis Batch: 690631

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<10		10	4.3	mg/L			12/20/22 03:19	1

Lab Sample ID: LCS 500-690631/2
Matrix: Water
Analysis Batch: 690631

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	250	250		mg/L		100	80 - 120

Method: SM 4500 Cl- E - Chloride, Total

Lab Sample ID: MB 500-690528/51
Matrix: Water
Analysis Batch: 690528

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<2.0		2.0	1.0	mg/L			12/19/22 10:38	1

Lab Sample ID: LCS 500-690528/52
Matrix: Water
Analysis Batch: 690528

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	20.0	20.0		mg/L		100	85 - 115

Method: SM 4500 NH3 G - Ammonia

Lab Sample ID: MB 500-691778/1-A
Matrix: Water
Analysis Batch: 691875

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 691778

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	<0.20		0.20	0.10	mg/L		12/29/22 11:24	12/29/22 14:04	1

Lab Sample ID: LCS 500-691778/2-A
Matrix: Water
Analysis Batch: 691875

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 691778

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Ammonia	2.00	2.12		mg/L		106	86 - 113

Method: SM 4500 NH3 G - Ammonia (Continued)

Lab Sample ID: 500-226999-1 MS
Matrix: Water
Analysis Batch: 691875

Client Sample ID: IW-2
Prep Type: Total/NA
Prep Batch: 691778

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Ammonia	11		2.00	10.6	4	mg/L		-35	75 - 125		

Lab Sample ID: 500-226999-1 MSD
Matrix: Water
Analysis Batch: 691875

Client Sample ID: IW-2
Prep Type: Total/NA
Prep Batch: 691778

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Ammonia	11		2.00	11.9	4	mg/L		28	75 - 125	11	20

Lab Chronicle

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Client Sample ID: IW-2

Date Collected: 12/16/22 12:45
Date Received: 12/16/22 14:43

Lab Sample ID: 500-226999-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	691491	W1T	EET CHI	12/28/22 13:26
Total/NA	Prep	3510C			690848	TS	EET CHI	12/21/22 08:08
Total/NA	Analysis	8270D		5	691560	JSB	EET CHI	12/28/22 17:23
Total/NA	Prep	3510C			690663	TS	EET CHI	12/20/22 07:50
Total/NA	Analysis	8081B		1	690841	SS	EET CHI	12/21/22 11:30
Total/NA	Prep	8151A			690666	TS	EET CHI	12/20/22 07:56
Total/NA	Analysis	8151A		1	690962	SS	EET CHI	12/21/22 15:53
Total Recoverable	Prep	3005A			691542	LMB	EET CHI	12/28/22 08:58 - 12/28/22 09:28 [1]
Total Recoverable	Analysis	6020B		5	692336	FXG	EET CHI	01/03/23 15:44
Total Recoverable	Prep	3005A			691542	LMB	EET CHI	12/28/22 08:58 - 12/28/22 09:28 [1]
Total Recoverable	Analysis	6020B		5	692437	FXG	EET CHI	01/03/23 19:55
Total Recoverable	Prep	3005A			691542	LMB	EET CHI	12/28/22 08:58 - 12/28/22 09:28 [1]
Total Recoverable	Analysis	6020B		200	692473	FXG	EET CHI	01/04/23 12:45
Total/NA	Prep	7470A			691402	MJG	EET CHI	12/27/22 12:05 - 12/27/22 14:05 [1]
Total/NA	Analysis	7470A		1	691594	MJG	EET CHI	12/28/22 07:21
Total/NA	Analysis	1010B		1	375910	WZC8	EET CF	12/31/22 09:30
Total/NA	Prep	9012B			375572	ENB7	EET CF	12/27/22 09:14
Total/NA	Analysis	9012B		1	375727	ZJX4	EET CF	12/28/22 21:28
Total/NA	Analysis	9034		1	690414	CLB	EET CHI	12/19/22 07:05 - 12/19/22 07:09 [1]
Total/NA	Analysis	9060A		10	557515	MMS	EET CAN	12/29/22 06:29
Total/NA	Analysis	Inorganic N		1	692907	PFK	EET CHI	01/06/23 17:31
Total/NA	Analysis	N07-0003		1	692250	LP	EET CHI	01/03/23 09:46
Total/NA	Analysis	SM 2320B		1	375456	MAQ3	EET CF	12/21/22 11:39
Total/NA	Analysis	SM 2540C		1	690631	CLB	EET CHI	12/20/22 04:00
Total/NA	Analysis	SM 2580B		1	692433	JC	EET CHI	01/04/23 10:30
Total/NA	Analysis	SM 2710F		1	692309	KF	EET CHI	01/03/23 16:14
Total/NA	Analysis	SM 4500 Cl- E		2000	690528	LP	EET CHI	12/19/22 11:38
Total/NA	Prep	SM 4500 NH3 B			691778	KF	EET CHI	12/29/22 11:24 - 12/29/22 12:24 [1]
Total/NA	Analysis	SM 4500 NH3 G		10	691875	KF	EET CHI	12/29/22 14:26

[1] Completion dates and times are reported or not reported per method requirements or individual lab discretion.

Laboratory References:

EET CAN = Eurofins Canton, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396
EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401
EET CHI = Eurofins Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Accreditation/Certification Summary

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Laboratory: Eurofins Chicago

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2903	04-29-23
Georgia	State	N/A	04-30-23
Georgia (DW)	State	939	04-30-23
Hawaii	State	NA	04-29-23
Illinois	NELAP	IL00035	04-30-23
Indiana	State	C-IL-02	04-29-23
Iowa	State	082	05-01-24
Kansas	NELAP	E-10161	10-31-23
Kentucky (UST)	State	AI # 108083	04-29-23
Kentucky (WW)	State	KY90023	12-31-22 *
Louisiana (All)	NELAP	02046	06-30-23
Mississippi	State	NA	04-30-23
North Carolina (WW/SW)	State	291	12-31-23
North Dakota	State	R-194	04-30-23
Oklahoma	State	8908	08-31-23
South Carolina	State	77001003	04-29-23
USDA	US Federal Programs	P330-18-00018	02-11-24
Wisconsin	State	999580010	08-31-23
Wyoming	State	8TMS-Q	04-30-23

Laboratory: Eurofins Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-27-23
Connecticut	State	PH-0590	12-31-23
Florida	NELAP	E87225	06-30-23
Georgia	State	4062	02-27-23
Illinois	NELAP	200004	07-31-23
Iowa	State	421	06-01-23
Kentucky (UST)	State	112225	02-27-23
Kentucky (WW)	State	KY98016	12-31-22
Michigan	State	9135	02-27-23
Minnesota	NELAP	039-999-348	12-31-23
Minnesota (Petrofund)	State	3506	08-01-23
New Jersey	NELAP	OH001	06-30-23
New York	NELAP	10975	04-01-23
Ohio	State	8303	02-27-23
Ohio VAP	State	CL0024	02-27-23
Oregon	NELAP	4062	02-27-23
Pennsylvania	NELAP	68-00340	08-31-23
Texas	NELAP	T104704517-22-17	08-31-23
Virginia	NELAP	460175	09-14-23
Washington	State	C971	01-12-23
West Virginia DEP	State	210	12-31-22

Laboratory: Eurofins Cedar Falls

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Colorado	Petroleum Storage Tank Program	IA100001 (OR)	09-29-23

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: Republic Services Inc
Project/Site: IW-2

Job ID: 500-226999-1

Laboratory: Eurofins Cedar Falls (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Georgia	State	IA100001 (OR)	09-29-23
Illinois	NELAP	200024	11-29-23
Iowa	State	007	12-01-23
Kansas	NELAP	E-10341	01-31-23
Minnesota	NELAP	019-999-319	12-31-23
Minnesota (Petrofund)	State	3349	01-18-24
North Dakota	State	R-186	09-29-23
Oregon	NELAP	IA100001	09-29-23

Eurofins Chicago
2417 Bond Street
University Park IL 60484
Phone (708) 534-5200 Phone (708) 534-5211

Chain of Custody Record

Environment Testing

Client Information	Sampler:	Lab PM: Kintz, Robin M	Carrier Tracking No(s): 500-226999 COC	379 1
Client Contact: Josh McGarry	Phone	E Mail: Robin Kintz@et.eurofinsus com	State of Origin	Page: Page 1 of 1
Company: Republic Services Inc	PWSID			Job #: 500-226999

Address: 2400 S Loomis Street	Due Date Requested	
City: Chicago	TAT Requested (days)	
State Zip: IL 60608	Compliance Project. Δ Yes Δ No	
Phone: 708-544-5195(Tel)	PO #: 30009849C	
Email: jmcgarry@republicservices com	WO #:	
Project Name: Newton County Landfill	Project #: 50012160	
Site:	SSOW#:	

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	1010B - Ignitability (Flash Point)	335.4 - Cyanide	8081B, 8270D	6020B, 7470A	SM4500NH3_G Ammonia	N07_0003 - NNN	SM4500_S2_F - Sulfide	8260B - VOCs - Custom List	9060A - TOC Duplicates	8151A - Herbicides - Custom	2320B, 2540C, 2710F, SM4500_Cl_E			Total Number of containers	Special Instructions/Note
			Preservation Code:				N	B	N	D	S	S	CB	A	S	N	N				
1 IW-2	12/16	1245																			

Preservation Codes

A	HCL	M	Hexane
B	NaOH	N	None
C	Zn Acetate	O	AsNaO2
D	Nitric Acid	P	Na2O4S
E	NaHSO4	Q	Na2SO3
F	MeOH	R	Na2S2O3
G	Amchlor	S	H2SO4
H	Ascorbic Acid	T	TSP Dodecahydrate
I	Ice	U	Acetone
J	DI Water	V	MCAA
K	EDTA	W	pH 4-5
L	EDA	Y	Trizma
		Z	other (specify)

Other:

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested I II III IV Other (specify)

Special Instructions/QC Requirements

Empty Kit Relinquished by:	Date	Time	Method of Shipment:

Relinquished by:	Date/Time	Company	Received by:	Date/Time 12/16/22 1430	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks: 5.9 - 4.9

Eurofins Chicago
2417 Bond Street
University Park, IL 60484
Phone: 708-534-5200 Fax: 708-534-5211

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Kintz, Robin M	Carrier Tracking No(s):	COC No: 500-168708.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Robin.Kintz@et.eurofinsus.com	State of Origin: Indiana	Page: Page 1 of 1
Company: Eurofins Environment Testing North Centr		Accreditations Required (See note):		Job #: 500-226999-1
Address: 180 S. Van Buren Avenue,	Due Date Requested: 12/28/2022			
City: Barberton	TAT Requested (days):			
State, Zip: OH, 44203				
Phone: 330-497-9396(Tel) 330-497-0772(Fax)	PO #:			
Email:	WO #:			
Project Name: NCL - Pretreatment Analyses	Project #: 50012160			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
Other:

G22

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9060A/ Organic Carbon, Total (TOC)	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
IW-2 (500-226999-1)	12/16/22	12:45 Eastern		Water			X	3	

Note: Since laboratory accreditations are subject to change, Eurofins Chicago places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Chicago laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Chicago attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Chicago.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) | Primary Deliverable Rank: 2 | Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:	
Relinquished by: [signature]	Date/Time: 12/16/22 1500	Company	Received by: [signature]	Date/Time: 12-17-22 1100	Company: EETNC
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Eurofins - Canton Sample Receipt Form/Narrative **Login # :** _____
Barberton Facility

Client ETA Site Name _____ Cooler unpacked by: Tammy Boyer

Cooler Received on 12-17-22 Opened on 12-17-22

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off Eurofins Courier Other _____

Receipt After-hours: Drop-off Date/Time _____ Storage Location _____

Eurofins Cooler # ETA Foam Box Client Cooler Box Other _____

Packing material used: Bubble Wrap Foam Plastic Bag None Other _____

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form

IR GUN # IR-13 (CF -0.2 °C) Observed Cooler Temp. _____ °C Corrected Cooler Temp. _____ °C
IR GUN # IR-16 (CF -0.1°C) Observed Cooler Temp. 2.1 °C Corrected Cooler Temp. 2.0 °C
IR GUN # IR-17 (CF -0.3°C) Observed Cooler Temp. _____ °C Corrected Cooler Temp. _____ °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1	Yes	No
-Were the seals on the outside of the cooler(s) signed & dated?	Yes	No NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes	No
-Were tamper/custody seals intact and uncompromised?	Yes	No NA
3. Shippers' packing slip attached to the cooler(s)?	Yes	No
4. Did custody papers accompany the sample(s)?	Yes	No
5. Were the custody papers relinquished & signed in the appropriate place?	Yes	No
6. Was/were the person(s) who collected the samples clearly identified on the COC?	Yes	No
7. Did all bottles arrive in good condition (Unbroken)?	Yes	No
8. Could all bottle labels (ID/Date/Time) be reconciled with the COC?	Yes	No
9. For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp(Y/N)?	Yes	No
10. Were correct bottle(s) used for the test(s) indicated?	Yes	No
11. Sufficient quantity received to perform indicated analyses?	Yes	No
12. Are these work share samples and all listed on the COC?	Yes	No
If yes, Questions 13-17 have been checked at the originating laboratory.		
13. Were all preserved sample(s) at the correct pH upon receipt?	Yes	No NA pH Strip Lot# HC291590
14. Were VOAs on the COC?	Yes	No
15. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this.	Yes	No NA
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____	Yes	No
17. Was a LL Hg or Me Hg trip blank present? _____	Yes	No

Tests that are not checked for pH by Receiving:
VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page

Samples processed by:

_____
_____
_____
_____

19. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.
Sample(s) _____ were received in a broken container.
Sample(s) _____ were received with bubble >6 mm in diameter. (Notify PM)

20. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory.
Time preserved: _____ Preservative(s) added/Lot number(s): _____

VOA Sample Preservation - Date/Time VOAs Frozen: _____

eurofins | Environment Testing America

500-226999 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information

Client: Chicago

City/State: CITY University Park STATE IL Project:

Receipt Information

Date/Time Received: DATE 12-17-22 TIME 1015 Received By: RL

Delivery Type: ☐ UPS ☑ FedEx SAT ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee
☐ Lab Courier ☐ Lab Field Services ☐ Client Drop-off ☐ Other:_____

Condition of Cooler/Containers

Sample(s) received in Cooler? ☑ Yes ☐ No *If yes:* Cooler ID:

Multiple Coolers? ☐ Yes ☑ No *If yes:* Cooler # _____ of _____

Cooler Custody Seals Present? ☑ Yes ☐ No *If yes:* Cooler custody seals intact? ☑ Yes ☐ No

Sample Custody Seals Present? ☐ Yes ☑ No *If yes:* Sample custody seals intact? ☐ Yes ☐ No

Trip Blank Present? ☐ Yes ☑ No *If yes:* Which VOA samples are in cooler? ↓

Temperature Record

Coolant: ☑ Wet ice ☐ Blue ice ☐ Dry ice ☐ Other:_____ ☐ NONE

Thermometer ID: R Correction Factor (°C): 0

• **Temp Blank Temperature** – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature

Uncorrected Temp (°C): 2.0 Corrected Temp (°C): 2.0

• **Sample Container Temperature**

	CONTAINER 1	CONTAINER 2
Container(s) used:		
Uncorrected Temp (°C):		
Corrected Temp (°C):		

Exceptions Noted

1) If temperature exceeds criteria, was sample(s) received same day of sampling? ☐ Yes ☐ No
   a) *If yes:* Is there evidence that the chilling process began? ☐ Yes ☐ No

2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) ☐ Yes ☐ No

NOTE If yes, contact PM before proceeding. If no, proceed with login

Additional Comments

Eurofins Chicago
2417 Bond Street
University Park, IL 60484
Phone 708-534-5200 Fax: 708-534-5211

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Kintz, Robin M	Carrier Tracking No(s):	COC No: 500-168711 1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Robin.Kintz@et.eurofinsus.com	State of Origin: Indiana	Page: Page 1 of 1
Company: Eurofins Environment Testing North Centr		Accreditations Required (See note):		Job #: 500-226999-1
Address: 3019 Venture Way, ,	Due Date Requested: 12/28/2022			
City: Cedar Falls	TAT Requested (days):			
State, Zip: IA, 50613				
Phone: 319-277-2401(Tel) 319-277-2425(Fax)	PO #:			
Email:	WO #:			
Project Name: NCL - Pretreatment Analyses	Project #: 50012160			
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	1010B/ Ignitability (Flash Point)	9012B/9012B_Prep Cyanide	2320B/ Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
IW-2 (500-226999-1)	12/16/22	12.45 Eastern		Water			X	X	X	3	

Preservation Codes:
A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Y - Trizma
Z - other (specify)
Other:

Note: Since laboratory accreditations are subject to change, Eurofins Chicago places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Chicago laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Chicago attention immediately If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Chicago.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested I, II, III, IV, Other (specify) Primary Deliverable Rank. 2	Special Instructions/QC Requirements

Empty Kit Relinquished by:	Date	Time	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	Shawn Scott	12/16/22 1500				
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 12-17-22 1015	Company

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks.

Login Sample Receipt Checklist

Client: Republic Services Inc

Job Number: 500-226999-1

Login Number: 226999
List Number: 1
Creator: James, Jeff A

List Source: Eurofins Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	4.9
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Republic Services Inc

Job Number: 500-226999-1

Login Number: 226999
List Number: 2
Creator: Kizer, Preston V

List Source: Eurofins Cedar Falls
List Creation: 12/17/22 11:10 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Attachment 5
Casing Mill Certifications

5691_GREENWICH EAGLE V-905E_4.5 11.36 J55 PE TENSION

TENSION STEEL INDUSTRIES CO., LTD.

MILL'S TEST CERTIFICATES

9F. NO. 127, SEC. 2 CHIEN KUO N. ROAD, TAIPEI 104 TAIWAN
TEL:(02)2500-6206 FAX:(02)2508-0398

SOLD TO		CERTIFICATE NO.	20011001	ISSUE DATE	Jan.10.2020
COMMODITY	API SCT J55 ERW PIPE PSL1	ORDER NO.	D19120301A	SHIPPING DATE	Jan.18.2020
SPECIFICATION	API SCT J55 SPECIFICATION; ITEM 2	PO NO.	223190824-P-01	INVOICE NO.	TT20011001

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION	QUANTITY	TENSILE ※1				HYDROSTATIC TEST 6SEC	OTHER TEST ※2	CHEMICAL COMPOSITION %																REMARK
				Y.S. Rt0.5	T.S. BODY	T.S. WELD	EL.			C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	V	Ti		C.E. ※3	
		SIZE x WALL THICKNESS x LENGTH	PCS/T	MPa			%	psi		x10²	x10²	x10²	x10³	x10³	x10²				x10³						
D191220023-001	JR132	4 1/2 INCH 0.250 INCH 42 FT	S8 12.551	521	636	—	28.0	4900	GOOD	28	126	21	12	4	1	1	2	Tr	31	1	Tr	1			
										28	127	21	12	4	1	1	2	Tr	31	1	Tr	1			
D191220023-001	LB314	4 1/2 INCH 0.250 INCH 42 FT	598 129.407	521	638	—	29.4	4900	GOOD	27	129	19	12	2	1	1	2	Tr	36	1	Tr	1			
				536	651	—	28.2			27	128	19	12	2	1	1	2	Tr	36	1	Tr	1			
D191220023-001	LB315	4 1/2 INCH 0.250 INCH 42 FT	843 182.425	537	646	—	29.2	4900	GOOD	26	130	18	11	2	1	1	2	Tr	34	1	Tr	1			
				549	661	—	28.2			26	130	19	11	2	1	1	2	Tr	34	1	Tr	1			
				479	632	—	31.0																		
		TOTAL	1,499 324.383																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST (NS)	LOCATION OF TENSIL	THREADS	Manufacturer: TENSION STEEL INDUSTRIES CO., LTD
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-	Trident PO NO.: 5691

NOTES

HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT (560℃)
※1 TENSILE TEST – ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM G.L.:50.8mm
※3—C.E. : CARBON EQUIVLENT ※4—F+P:F-FERRITE P-PEARLITE ※5—IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×5×55

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF THE ABOVE SPECIFICATION.THE INSPECTION CERTIFICATE 3.1.B IS ISSUED IN ACCORDANCE WITH ISO 10474:1991.

QUALITY ASSURANCE DEP.

BP01-F03-4

5691_GREENWICH EAGLE V-905E_4.5 11.36 J55 PE TENSION

TENSION STEEL INDUSTRIES CO., LTD.

MILL'S TEST CERTIFICATES

9F. NO. 127, SEC. 2 CHIEN KUO N. ROAD, TAIPEI 104 TAIWAN
TEL:(02)2500-6206 FAX:(02)2508-0398

SOLD TO		CERTIFICATE NO.	20011001	ISSUE DATE	Jan.10.2020
COMMODITY	API 5CT J55 ERW PIPE PSL1	ORDER NO.	D19120301A	SHIPPING DATE	Jan.18.2020
SPECIFICATION	API 5CT J55 SPECIFICATION; ITEM 2	PO NO.	223190824-P-01	INVOICE NO.	TT20011001

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION	QUANTITY	TENSILE ※1 Y.S. Rt0.5	TENSILE ※1 T.S. BODY	TENSILE ※1 T.S. WELD	TENSILE ※1 EL.	HYDROSTATIC TEST 6SEC	OTHER TEST ※2	CHEMICAL COMPOSITION % C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	V	Ti		C.E. ※3	REMARK
		SIZE x WALL THICKNESS x LENGTH	PCS/T	MPa			%	psi		$x10^2$	$x10^2$	$x10^2$	$x10^3$	$x10^3$	$x10^2$				$x10^3$						
D191220023-001	JR132	4 1/2 INCH 0.250 INCH 42 FT	58 12.551	521	636	—	28.0	4900	GOOD	28	126	21	12	4	1	1	2	Tr	31	1	Tr	1			
										28	127	21	12	4	1	1	2	Tr	31	1	Tr	1			
D191220023-001	LB314	4 1/2 INCH 0.250 INCH 42 FT	598 129.407	521	638	—	29.4	4900	GOOD	27	129	19	12	2	1	1	2	Tr	36	1	Tr	1			
				536	651	—	28.2			27	128	19	12	2	1	1	2	Tr	36	1	Tr	1			
D191220023-001	LB315	4 1/2 INCH 0.250 INCH 42 FT	843 182.425	537	646	—	29.2	4900	GOOD	26	130	18	11	2	1	1	2	Tr	34	1	Tr	1			
				549	661	—	28.2			26	130	19	11	2	1	1	2	Tr	34	1	Tr	1			
				479	632	—	31.0																		
		TOTAL	1,499 324.383																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST (N5)	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

Manufacturer:
TENSION STEEL INDUSTRIES CO., LTD

Trident PO NO.: 5691

NOTES

HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT (560℃)
※1 TENSILE TEST – ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM G.L.:50.8mm
※3—C.E. : CARBON EQUIVLENT ※4—F+P:F-FERRITE P-PEARLITE ※5—IMPACT : C1-10×10×5S C2-10×7.5×5S C3-10×5×5S

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF THE ABOVE SPECIFICATION.THE INSPECTION CERTIFICATE 3.1.B IS ISSUED IN ACCORDANCE WITH ISO 10474:1991.

QUALITY ASSURANCE DEP.

Timin Tan

中鴻鋼鐵 CHUNG HUNG STEEL

ORIGINAL

MILL TEST CERTIFICATE

CHUNG HUNG STEEL CORPORATION (CSC GROUP)
317, YU LIAO ROAD, CHIAO TOU DISTRICT,
KAOHSIUNG CITY 82544, TAIWAN (R.O.C.)
TEL: +886-7-6117171 FAX: +886-7-6110594

CUSTOMER		CERTIFICATE NO.	P18A300001	ISSUE DATE	OCT 3 1 2018
COMMODITY	ERW CARBON STEEL PIPE, PLAIN ENDS, WITH MILL'S LACQUER COATING. SPEC: API 5CT J55 PSL-1, CASING (9TH ED., 2011)	CONTRACT NO.	PA76PCA	SHIPPING DATE	OCT 3 1 2018
SPECIFICATION	API 5CT J55 PSL-1, CASING (9TH ED., 2011)	ORDER NO.		INVOICE NO.	IP18100047

Size	Quantity	Heat No.	U.T.	F.T.	H.T. (psi)	Chemical Compositions (%)														C.E. (%)		Mechanical Properties											
																						Tensile Test					Impact Test						Hardness
						Test Freq.	C	Si	Mn	P	S	V	Al	Nb	Ti	Mo	Cu	Ni	Cr	IIW <0.43	Pcm <0.25	Loc.	Y.S. (ksi)	T.S. (ksi)	Temp (°F)	EL. %	Loc.	Individual Value (ft.lbs)			Ave. (ft.lbs)	S&T (%)	Temp. (°F)	HRC
							x100			x1000		x100																					
4-1/2" x 0.250" x 42'	547.568MT (2530pcs)	18JJ572 (18.360MT) (85pcs)	OK	OK	4900	L	14	16	97	13	3	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	72	78	R	27	-	-	-	-	-	-	-	-
						P	15	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18KD823 (9.072MT) (42pcs)				L	14	14	97	13	3	Tr	3	2	Tr	Tr	1	Tr	2	-	-	L90	69	77	R	28	-	-	-	-	-	-	-	-
						P	14	13	94	12	1	Tr	2	2	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						P	14	13	94	12	1	Tr	2	2	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18KG792 (86.832MT) (402pcs)				L	13	14	96	15	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	74	81	R	26	-	-	-	-	-	-	-	-
						P	15	14	96	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						P	15	14	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						L	13	14	96	15	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	73	80	R	26	-	-	-	-	-	-	-	-
						P	15	14	96	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						P	15	14	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18KG793 (42.552MT) (197pcs)				L	14	13	97	14	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	75	80	R	25	-	-	-	-	-	-	-	-
						P	16	12	96	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						P	16	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note:
1. U.T.: Ultrasonic Test; R.T.: Radiographic Test; H.T.: Hydrostatic Test; F.T.: Flattening Test; Tr: Trace Element
2. Hydrostatic Test passed, pressure with D<18" (457mm) held for not less than 6 sec. and D>18" (457mm) held for not less than 11 sec.
3. MTC in accordance with EN 10204 3.1 and API 5CT SR15
4. Mercury and Lead Free
5. Origin: Taiwan (Raw Material supplied by CSC)
6. Oversized Drift: DA6.250 for 7"x0.317"(23.0#); DA7.875 for 8-5/8"x0.352"(32.0#); DA8.750 for 9-5/8"x0.395"(40.0#); DA9.875 for 10-3/4"x0.400"(45.5#)
7. PO# 6718-18S

WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

LUKANG MILL
42, Lugong Road, Changhua Coastal Industrial Park, Lukang Township, Changhua County 50544, TAIWAN (R.O.C.)

DAFA MILL
18 Huachung Road, Dafa Industrial Park, Daliao District, Kaohsiung City 83162, TAIWAN (R.O.C.)

GENERAL MANAGER / TECHNOLOGY DEPARTMENT

中鴻鋼鐵 CHUNGHUNGSTEEL

ORIGINAL

MILL TEST CERTIFICATE

CHUNG HUNG STEEL CORPORATION (CSC GROUP)
317, YU LIAO ROAD, CHIAO TOU DISTRICT,
KAOHSIUNG CITY 82544, TAIWAN (R.O.C.)
TEL: +886-7-6117171 FAX: +886-7-6110594

CUSTOMER		CERTIFICATE NO.	P18A300002	ISSUE DATE	OCT 3 1 2018
COMMODITY	ERW CARBON STEEL PIPE, PLAIN ENDS, WITH MILL'S LACQUER COATING. SPEC: API 5CT J55 PSL-1, CASING (9TH ED., 2011)	CONTRACT NO.	PA76PCA	SHIPPING DATE	OCT 3 1 2018
SPECIFICATION	API 5CT J55 PSL-1, CASING (9TH ED., 2011)	ORDER NO.		INVOICE NO.	IP18100047

Size	Quantity	Heat No.	U.T.	F.T.	H.T. (psi)	Chemical Compositions (%)														C.E. (%)		Mechanical Properties												
																						Tensile Test					Impact Test							Hard-ness
						Test Freq.	C	Si	Mn	P	S	V	Al	Nb	Ti	Mo	Cu	Ni	Cr	IIW <0.43	Pcm <0.25	Loc.	Y.S. (ksi)	T.S. (ksi)	Temp (°F)	EL. %	Loc.	Individual Value (ft.lbs)				Ave. (ft.lbs)	S&T (%)	Temp. (°F)	HRC
							x100			x1000		x100																						
4-1/2" x 0.250" x 42'		18KG794 (105.192MT) (487pcs)				L	14	15	99	13	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	72	79	R	28	-	-	-	-	-	-	-	-
						P	15	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	16	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						L	14	15	99	13	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	74	81	R	26	-	-	-	-	-	-	-	-
						P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	14	13	96	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18KG795 (32.616MT) (151pcs)				L	14	13	95	15	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	73	79	R	27	-	-	-	-	-	-	-	-
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18KG796 (18.576MT) (86pcs)				L	14	12	99	13	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	73	80	R	26	-	-	-	-	-	-	-	-
						P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18PV075 (17.712MT) (82pcs)				L	15	13	100	12	2	Tr	2	2	Tr	Tr	1	1	2	-	-	L90	73	79	R	25	-	-	-	-	-	-	-	-
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Note:
1. U.T.: Ultrasonic Test; R.T.: Radiographic Test; H.T.: Hydrostatic Test; F.T.: Flattening Test; Tr: Trace Element
2. Hydrostatic Test passed, pressure with D<18" (457mm) held for not less than 6 sec. and D>18" (457mm) held for not less than 11 sec.
3. MTC in accordance with EN 10204 3.1 and API 5CT SR15
4. Mercury and Lead Free
5. Origin: Taiwan (Raw Material supplied by CSC)
6. Oversized Drift: DA6.250 for 7"x0.317"(23.0#); DA7.875 for 8-5/8"x0.352"(32.0#); DA8.750 for 9-5/8"x0.395"(40.0#); DA9.875 for 10-3/4"x0.400"(45.5#)
7. PO# 6718-18S

WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

LUKANG MILL
42, Lugong Road, Changhua Coastal Industrial Park, Lukang Township, Changhua County 50544, TAIWAN (R.O.C.)

DAFA MILL
18, Huachung Road, Dafa Industrial Park, Daliao District, Kaohsiung City 83162, TAIWAN (R.O.C.)

GENERAL MANAGER / TECHNOLOGY DEPARTMENT

中鴻鋼鐵 CHUNG HUNG STEEL

ORIGINAL

MILL TEST CERTIFICATE

CHUNG HUNG STEEL CORPORATION (CSC GROUP)
317, YU LIAO ROAD, CHIAO TOU DISTRICT,
KAOHSIUNG CITY 82544, TAIWAN (R.O.C.)
TEL: +886-7-6117171 FAX: +886-7-6110594

CUSTOMER		CERTIFICATE NO.	P18A300003	ISSUE DATE	OCT 3 1 2018
COMMODITY	ERW CARBON STEEL PIPE, PLAIN ENDS, WITH MILL'S LACQUER COATING. SPEC: API 5CT J55 PSL-1, CASING (9TH ED., 2011)	CONTRACT NO.	PA76PCA	SHIPPING DATE	OCT 3 1 2018
SPECIFICATION	API 5CT J55 PSL-1, CASING (9TH ED., 2011)	ORDER NO.		INVOICE NO.	IP18100047

Size	Quantity	Heat No.	U.T.	F.T.	H.T. (psi)	Chemical Compositions (%)														C.E. (%)		Mechanical Properties												
																						Tensile Test					Impact Test							Hardness
						Test Freq.	C	Si	Mn	P	S	V	Al	Nb	Ti	Mo	Cu	Ni	Cr	IIW <0.43	Pcm <0.25	Loc.	Y.S. (ksi)	T.S. (ksi)	Temp (°F)	EL. %	Loc.	Individual Value (ft.lbs)				Ave. (ft.lbs)	S&T (%)	Temp (°F)	HRC
							x100			x1000		x100																						
4-1/2" x 0.250" x 42'		18PV090				L	15	14	98	17	2	Tr	2	2	Tr	Tr	1	1	2	-	-	L90	73	80	R	26	-	-	-	-	-	-	-	-
		(18.144MT)				P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(84pcs)				P	15	12	95	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18PV615				L	14	14	100	16	3	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	74	79	R	25	-	-	-	-	-	-	-	-
		(85.112MT)				P	14	13	94	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(389pcs)				P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18PV616				L	14	14	97	13	2	Tr	3	2	Tr	Tr	1	1	1	-	-	L90	71	79	R	28	-	-	-	-	-	-	-	-
		(17.712MT)				P	14	13	93	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(82pcs)				P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18PV617				L	14	14	98	15	2	Tr	4	2	Tr	Tr	1	1	2	-	-	L90	71	78	R	26	-	-	-	-	-	-	-	-
		(35.424MT)				P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	Tr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(164pcs)				P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18PV618				L	13	12	98	17	2	Tr	4	2	Tr	Tr	1	1	2	-	-	L90	73	80	R	26	-	-	-	-	-	-	-	-
		(17.496MT)				P	14	13	95	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(81pcs)				P	14	13	94	14	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note:
1. U.T.: Ultrasonic Test; R.T.: Radiographic Test; H.T.: Hydrostatic Test; F.T.: Flattening Test Tr: Trace Element
2. Hydrostatic Test passed, pressure with D<18" (457mm) held for not less than 6 sec. and D>18" (457mm) held for not less than 11 sec.
3. MTC in accordance with EN 10204 3.1 and API 5CT SR15
4. Mercury and Lead Free
5. Origin: Taiwan (Raw Material supplied by CSC)
6. Oversized Drift: DA6.250 for 7"x0.317"(23.0#); DA7.875 for 8-5/8"x0.352"(32.0#); DA8.750 for 9-5/8"x0.395"(40.0#); DA9.875 for 10-3/4"x0.400"(45.5#)
7. PO# 6718-18S

WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

LUKANG MILL
42, Lugong Road, Changhua Coastal Industrial Park, Lukang Township, Changhua County 50544, TAIWAN (R.C.C.)

DAFA MILL
18, Huachung Road, Dafa Industrial Park, Daliao District, Kaohsiung City 83162, TAIWAN (R.O.C.)

GENERAL MANAGER / TECHNOLOGY DEPARTMENT

中鴻鋼鐵 CHUNGHUNGSTEEL

ORIGINAL

MILL TEST CERTIFICATE

CHUNG HUNG STEEL CORPORATION (CSC GROUP)
317, YU LIAO ROAD, CHIAO TOU DISTRICT,
KAOHSIUNG CITY 82544, TAIWAN (R.O.C.)
TEL: +886-7-6117171 FAX: +886-7-6110594

CUSTOMER		CERTIFICATE NO.	P18A300004	ISSUE DATE	OCT 31 2018
COMMODITY	ERW CARBON STEEL PIPE, PLAIN ENDS, WITH MILL'S LACQUER COATING. SPEC: API 5CT J55 PSL-1, CASING (9TH ED., 2011)	CONTRACT NO.	PA76PCA	SHIPPING DATE	OCT 31 2018
SPECIFICATION	API 5CT J55 PSL-1, CASING (9TH ED., 2011)	ORDER NO.		INVOICE NO.	IP18100047

Size	Quantity	Heat No.	U.T.	F.T.	H.T. (psi)	Chemical Compositions (%)														C.E. (%)		Mechanical Properties												
																						Tensile Test					Impact Test							Hardness
						Test Freq.	C	Si	Mn	P	S	V	Al	Nb	Ti	Mo	Cu	Ni	Cr	IIW <0.43	Pcm <0.25	Loc.	Y.S. (ksi)	T.S. (ksi)	Temp (°F)	EL. %	Loc.	Individual Value (ft.lbs)				Ave. (ft.lbs)	S&T (%)	Temp (°F)	HRC
							x100			x1000		x100																						
4-1/2" x 0.250" x 42'		4FS65				L	26	19	131	10	2	Tr	3	Tr	Tr	Tr	Tr	1	26	-	-	L90	64	78	R	26	-	-	-	-	-	-	-	-
		(16.416MT)				P	26	18	130	10	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(76pcs)				P	26	18	129	9	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5CR06				L	26	18	131	16	2	Tr	3	Tr	Tr	Tr	Tr	1	24	-	-	L90	66	80	R	27	-	-	-	-	-	-	-	-
		(11.448MT)				P	25	17	129	9	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(53pcs)				P	26	17	130	10	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5CR12				L	26	18	130	15	5	Tr	3	Tr	Tr	Tr	Tr	1	25	-	-	L90	64	78	R	26	-	-	-	-	-	-	-	-
		(14.904MT)				P	25	17	129	9	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(69pcs)				P	26	17	130	10	Tr	Tr	3	Tr	Tr	Tr	Tr	Tr	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-1/2" x 0.250" x 42'	1.299MT	18KG795	OK	OK	4900	L	14	13	95	15	2	Tr	3	2	Tr	Tr	1	1	2	-	-	L90	73	79	R	27	-	-	-	-	-	-	-	-
	(6pcs)	(0.432MT)				P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(2pcs)				P	15	12	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18PV617				L	14	14	98	15	2	Tr	4	2	Tr	Tr	1	1	2	-	-	L90	71	78	R	26	-	-	-	-	-	-	-	-
		(0.867MT)				P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	Tr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		(4pcs)				P	14	14	94	13	1	Tr	3	1	Tr	Tr	Tr	Tr	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note:
1. U.T.: Ultrasonic Test; R.T.: Radiographic Test; H.T.: Hydrostatic Test; F.T.: Flattening Test; Tr: Trace Element
2. Hydrostatic Test passed, pressure with D<18" (457mm) held for not less than 6 sec. and D>18" (457mm) held for not less than 11 sec.
3. MTC in accordance with EN 10204 3.1 and API 5CT SR15
4. Mercury and Lead Free
5. Origin: Taiwan (Raw Material supplied by CSC)
6. Oversized Drift: DA6.250 for 7"x0.317"(23.0#); DA7.875 for 8-5/8"x0.352"(32.0#); DA8.750 for 9-5/8"x0.395"(40.0#); DA9.875 for 10-3/4"x0.400"(45.5#)
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WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

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DAFA MILL
18, Huachung Road, Dafa Industrial Park, Daliao District, Kaohsiung City 83162, TAIWAN (R.O.C.)

GENERAL MANAGER / TECHNOLOGY DEPARTMENT

CERTIFICATE NO(성적서 번호) : E204067

DATE OF ISSUE(발행일자) : 2020-02-27

CONTRACT(P/O) NO.(계약번호) : HSUOP-20004

PR NO.(주문서 번호) : E200200073

COMMODITY(제품명) : E.R.W. STEEL PIPE

SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL
울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure PSI	Hydrostatic Test Time SEC	Spec.	※2	Tensile Properties(Gage Length : 2 inch) Tensile Strength Base PSI	Tensile Strength Weld PSI	Yield Strength PSI	Y/R Rate %	E.L %	Hardness Test ※3	Hardness Test Max. Value	CVN Impact Test ※2 ※3	CVN Impact Test(℃) Absorbed Energy(Joule) 1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
									Min.		75000		55000					Specimen size								
									Max.				80000						Criteria : In the case of 10×10							
1	EB PE	13-3/8" X 0.380 " X 41.400 F	64	63,378	2,649.6	R16022	1900	5		L	86440		64530		32											
2	EB PE	13-3/8" X 0.380 " X 41.400 F	50	49,514	2,070	R16028	1900	5		L	86010		66540		33											
		TOTAL	114	112,892	4,719.6																					

No.	Heat No.	Spec.	※4	Chemical Composition(%) C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B	Zn-Coating Test Zn Coating	Copper Sulfate Test Time	Copper Sulfate Test Result	HC-Test Collapse Pressure	H.I.C Test CLR	CTR	CSR	S.S.C.C Test
				2:×100 3:×1000 4:×10000																				
		Min.																						
		Max.					30	30																
1	R16022		H	24	20	138	12	1																
			P	23	17	138	10	TR	6	1	3	14	2	TR	7	TR								
			P	23	18	139	10	TR	6	1	3	14	3	TR	8	TR								
2	R16028		H	23	20	137	11	2																
			P	23	17	134	8	TR	4	1	2	14	2	TR	7	TR								
			P	23	17	135	8	TR	4	1	2	14	2	TR	8	TR								

Remark

※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR - API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

Heat Treatment	Non-Destructive Test (U,T)	Flattening / Bending Test	Visual & Dimension	Drift Test
GOOD	GOOD	GOOD	GOOD	GOOD

본 제품은 관련 규격에 합격되었음을 보증합니다.
This material has been manufactured, sampled, tested and inspected in accordance with the specification and has been found to meet the requirements.
* 본 검사증명서에 명기된 규격용도외 사용시 안전상 문제가 발생할 수 있으며, 검사증명서 위.변조시 사문서 위조로 불이익을 당하실 수 있습니다.

SURVEYOR

H.K. CHOI
QA Manager

* 본 검사증명서는 원본인 전자문서(전자서명 정보 포함)로부터 출력된 사본입니다. 전자문서의 내용은 현대제철 고객포탈에서 확인하실 수 있습니다.(http://sm.hyundai-steel.com/cs/cm/login.jsp)
* This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check an original electronic document at hyundaisteel's customer portal.(http://sm.hyundai-steel.com/cs/cm/login.jsp) * QRcode scanner App : 'QReal'

CERTIFICATE NO(성적서 번호) : E204068

DATE OF ISSUE(발행일자) : 2020-02-27

CONTRACT(P/O) NO.(계약번호) : HSUOP-20004

PR NO.(주문서 번호) : E200200073

COMMODITY(제품명) : E.R.W. STEEL PIPE

SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL

울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure PSI	Hydrostatic Test Time SEC	Spec.	※2	Tensile Properties(Gage Length : 2 inch) Tensile Strength Base PSI	Tensile Strength Weld PSI	Yield Strength PSI	Y/R Rate %	E.L %	Hardness Test ※3	Hardness Test Max. Value	※2 ※3	CVN Impact Test Specimen size	CVN Impact Test(℃) Absorbed Energy(Joule) 1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
									Min.		75000		55000														
							PSI	SEC	Max.				80000						Criteria : In the case of 10×10								
1	EB PE	13-3/8" X 0.380 " X 41.400 F	84	83,184	3,477.6	R15655	1900	5		L	87020		67200		34												
2	EB PE	13-3/8" X 0.380 " X 41.400 F	26	25,747	1,076.4	R16028	1900	5		L	86010		66540		33												
		TOTAL	110	108,931	4,554																						

No.	Heat No.	Spec.	※4	Chemical Composition(%) C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B	2:×100 3:×1000 4:×10000
				2	2	2	3	3	2	2	2	3	3	3	3	4	
		Min.															
		Max.					30	30									
1	R15655		H	23	19	138	8	2									
			P	23	17	138	8	1	2	1	2	14	3	TR	8	TR	
			P	23	17	138	8	1	2	1	2	14	3	TR	8	TR	
2	R16028		H	23	20	137	11	2									
			P	23	17	134	8	TR	4	1	2	14	2	TR	7	TR	
			P	23	17	135	8	TR	4	1	2	14	2	TR	8	TR	

No.	Heat No.	Zn-Coating Test Zn Coating	Copper Sulfate Test Time	Copper Sulfate Test Result	HC-Test Collapse Pressure psi	H.I.C Test CLR %	H.I.C Test CTR %	H.I.C Test CSR %	S.S.C.C Test
1	R15655								
2	R16028								

Remark

※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR – API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

Heat Treatment	Non-Destructive Test (U.T)	Flattening / Bending Test	Visual & Dimension	Drift Test
GOOD	GOOD	GOOD	GOOD	GOOD

본 제품은 관련 규격에 합격되었음을 보증합니다.
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SURVEYOR

H.K.CHOI

QA Manager

CERTIFICATE NO(성적서 번호) : E204333

DATE OF ISSUE(발행일자) : 2020-02-28

CONTRACT(P/O) NO.(계약번호) : HSUOP-20004

PR NO.(주문서번호) : E200200073

COMMODITY(제품명) : E.R.W. STEEL PIPE

SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL
울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure PSI	Hydrostatic Test Time SEC	Spec.	※2	Tensile Properties(Gage Length : 2 inch) Tensile Strength Base PSI	Tensile Strength Weld PSI	Yield Strength PSI	Y/R Rate %	E.L %	Hardness Test ※3 Max. Value	※2 ※3	CVN Impact Test CVN Impact Test(℃) Specimen size	Absorbed Energy(Joule) 1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
									Min.		75000		55000													
									Max.				80000					Criteria : In the case of 10×10								
1	EB PE	13-3/8" X 0.380 " X 41.400 F	55	54.466	2.277	R16005	1900	5		L	90940		72440		31											
2	EB PE	13-3/8" X 0.380 " X 41.400 F	5	4.951	207	R16022	1900	5		L	86440		64530		32											
3	EB PE	13-3/8" X 0.380 " X 41.400 F	22	21.786	910.8	R19057	1900	5		L	94560		76890		32											
		TOTAL	82	81.203	3.394.8																					

No.	Heat No.	Spec.	※4	Chemical Composition(%) C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B	2:×100 3:×1000 4:×10000	Zn-Coating Test Zn Coating	Copper Sulfate Test Time	Copper Sulfate Test Result	HC-Test Collapse Pressure psi	H.I.C Test CLR %	CTR %	CSR %	S.S.C.C Test
		Min.																							
		Max.					30	30																	
1	R16005		H	24	18	134	11	2																	
			P	24	18	137	18	7	1	1	2	38	3	13	19	6									
			P	24	19	137	19	8	1	1	3	38	3	13	20	6									
2	R16022		H	24	20	138	12	1																	
			P	23	17	138	10	TR	6	1	3	14	2	TR	7	TR									
			P	23	18	139	10	TR	6	1	3	14	3	TR	8	TR									
3	R19057		H	24	17	136	10	1																	
			P	24	16	137	18	8	TR	1	2	38	3	13	18	6									
			P	24	16	138	18	8	TR	1	2	38	3	13	18	7									

Remark

※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR – API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN),HYUNDAI STEEL(KOREA)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

Heat Treatment	Non-Destructive Test (U.T)	Flattening / Bending Test	Visual & Dimension	Drift Test
GOOD	GOOD	GOOD	GOOD	GOOD

본 제품은 관련 규격에 합격되었음을 보증합니다.
This material has been manufactured, sampled, tested and inspected in accordance with the specification and has been found to meet the requirements.
* 본 검사증명서에 명기된 규격용도외 사용시 안전상 문제가 발생할 수 있으며, 검사증명서 위,변조시 사문서 위조로 불이익을 당하실 수 있습니다.

SURVEYOR

H.K. CHOI
QA Manager

CERTIFICATE NO(성적서 번호) : E204336

DATE OF ISSUE(발행일자) : 2020-02-28

CONTRACT(P/O) NO.(계약번호) : HSUOP-20004

PR NO.(주문서번호) : E200200073

COMMODITY(제품명) : E.R.W. STEEL PIPE

SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL
울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure PSI	Hydrostatic Test Time SEC	Spec. Min.	Spec. Max.	※2	Tensile Properties(Gage Length : 2 inch) Tensile Strength Base PSI	Tensile Strength Weld PSI	Yield Strength PSI	Y/R Rate %	E.L %	Hardness Test ※3	Hardness Test Max. Value	※2 ※3	CVN Impact Test Specimen size	CVN Impact Test(℃) Absorbed Energy(Joule) 1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
							PSI	SEC	Min.	Max.		75000		55000						Criteria : In the case of 10×10								
														80000														
1	EB PE	13-3/8" X 0.380 " X 41.400 F	84	83,184	3,477.6	R15655	1900	5			L	87020		67200		34												
2	EB PE	13-3/8" X 0.380 " X 41.400 F	50	49,514	2,070	R16005	1900	5			L	90940		72440		31												
3	EB PE	13-3/8" X 0.380 " X 41.400 F	140	138,640	5,796	R16022	1900	5			L	86440		64530		32												
4	EB PE	13-3/8" X 0.380 " X 41.400 F	26	25,747	1,076.4	R16028	1900	5			L	86010		66540		33												

Chemical Composition(%) 2:×100 3:×1000 4:×10000

No.	Heat No.	Spec.	※4	C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B	Zn-Coating Test: Zn Coating	Copper Sulfate Test: Time	Copper Sulfate Test: Result	HIC-Test Collapse Pressure	H.I.C Test: CLR	CTR	CSR	S.S.C.C Test
				2	2	2	3	3	2	2	2	3	3	3	3	4				psi	%	%	%	
		Min.																						
		Max.					30	30																
1	R15655		H	23	19	138	8	2																
			P	23	17	138	8	1	2	1	2	14	3	TR	8	TR								
			P	23	17	138	8	1	2	1	2	14	3	TR	8	TR								
2	R16005		H	24	18	134	11	2																
			P	24	18	137	18	7	1	1	2	38	3	13	19	6								
			P	24	19	137	19	8	1	1	3	38	3	13	20	6								
3	R16022		H	24	20	138	12	1																
			P	23	17	138	10	TR	6	1	3	14	2	TR	7	TR								
			P	23	18	139	10	TR	6	1	3	14	3	TR	8	TR								
4	R16028		H	23	20	137	11	2																
			P	23	17	134	8	TR	4	1	2	14	2	TR	7	TR								
			P	23	17	135	8	TR	4	1	2	14	2	TR	8	TR								

Remark

※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR – API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

Heat Treatment	Non-Destructive Test (U.T)	Flattening / Bending Test	Visual & Dimension	Drift Test				
GOOD	GOOD	GOOD	GOOD	GOOD				

본 제품은 관련 규격에 합격되었음을 보증합니다.
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SURVEYOR

H.K. CHOI
QA Manager

CERTIFICATE NO(성적서 번호) : E204336

DATE OF ISSUE(발행일자) : 2020-02-28

CONTRACT(P/O) NO.(계약번호) : HSUOP-20004

PR NO.(주문서 번호) : E200200073

COMMODITY(제품명) : E.R.W. STEEL PIPE

SPECIFICATION(제품규격) : API 5CT J55

검사증명서
MILL TEST CERTIFICATE
EN 10204 TYPE 3.1 - 2004

CUSTOMER(고객사):

HYUNDAI STEEL
울산공장 : 울산광역시 북구 염포로 706
706, Yeompo-ro, Buk-gu, Ulsan, Korea

No.	TYPE OF PIPE END ※1	SIZE OUT-DIA×THICK×LENGTH (외경×두께×길이)	PCS (본)	WEIGHT (KG)	TOTAL LENGTH (F)	HEAT No.	Hydrostatic Test Pressure	Hydrostatic Test Time	Spec.	※2	Tensile Properties(Gage Length : 2 inch) Tensile Strength Base	Tensile Strength Weld	Yield Strength	Y/R Rate	E.L	Hardness Test ※3	Hardness Test Max. Value	CVN Impact Test ※2 ※3	CVN Impact Test(℃) Absorbed Energy(Joule) 1	2	3	avg	Shear Area (%)	D.W.T Test(℃) Shear Area(%) 1	2	avg
							PSI	SEC	Min.		PSI	PSI	PSI	%	%			Specimen size								
									Max.										Criteria : In the case of 10×10							
		TOTAL	300	297,085	12,420						75000		55000													
													80000													

No.	Heat No.	Spec.	※4	Chemical Composition(%) C	Si	Mn ※7	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	B	Zn-Coating Test Zn Coating	Copper Sulfate Test Time	Copper Sulfate Test Result	HC-Test Collapse Pressure	H.I.C Test CLR	CTR	CSR	S.S.C.C Test
				2	2	2	3	3	2	2	2	3	3	3	3	4								
		Min.																		psi	%	%	%	
		Max.					30	30																

2 : ×100 3 : ×1000 4 : ×10000

Heat Treatment	Non-Destructive Test (U.T)	Flattening / Bending Test	Visual & Dimension	Drift Test					
GOOD	GOOD	GOOD	GOOD	GOOD					

Remark

※1) Type of pipe end(관종)
EB:ERW Black PE:Plain End
※2) L: Longitudinal, T: Transverse
※3) B: Base, W: Weld Line, H: Heat Affected Zone
※4) H: Heat(Ladle) Analysis, P: Product Analysis
※ SPEC YEAR – API 5CT 10th Edition(2019)
※ Heat Treatment Temperature: Min 1000℃
※ Steel maker(Country of melting) : TOKYO STEEL(JAPAN)
※ Tensile test : Strip specimen(1L90, Width : 38.1mm)

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SURVEYOR

H.K. CHOI
QA Manager

TENSION STEEL INDUSTRIES CO., LTD.

9F. NO. 127 SEC 2 CHIEN KUO N. ROAD,TAIPEI. TAIWAN, R.O.C.
TEL:(02)2500-6206 FAX:(02)2508-0398

MILL TEST REPORT

SOLD TO		CERTIFICATE NO.	19032502	ISSUE DATE	MAR.25.2019
COMMODITY	PRIME NEWLY PRODUCED ERW STEEL PIPE, BLACK, PLAIN END	ORDER NO.	D18120303S	SHIPPING DATE	MAR.31.2019
SPECIFICATION	API 5CT-9th J55 PSL1			INVOICE NO.	TPE2019041501

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION	QUANTITY	TENSILE ※1				HYDROSTATIC TEST 6SEC	OTHER TEST ※2	CHEMICAL COMPOSITION %																REMARK
				Y.S. Rt0.5	T.S. BODY	T.S. WELD	EL.			C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	V	Ti		C.E. ※3	
		O.D.×THICKNESS×LENGTH	PCS/T	MPa				psi		x10^2	x10^2	x10^2	x10^3	x10^3	x10^2				x10^3							
D190220001-001	JM921	9-5/8"×0.352"×42'	35 23.263	443	536	—	34.0	3200	GOOD	15	93	12	25	3											
										16	92	12	25	3											
D190220001-001	JM922	9-5/8"×0.352"×42'	180 119.640	490	565	—	35.0	3200	GOOD	15	96	14	21	3											
										15	97	14	21	3											
D190220001-001	JN070	9-5/8"×0.352"×42'	160 106.347	453	535	—	34.0	3200	GOOD	15	98	14	15	3											
										15	98	14	15	2											
		TOTAL	375 249.250																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	–

Manufacturer:
TENSION STEEL INDUSTRIES CO., LTD.

NOTES

HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT
※1 TENSILE TEST - ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM G.L.:50.8mm
※3 - C.E. : CARBON EQUIVLENT ※4 - F+P:F-FERRITE P-PEARLITE ※5 - IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×5×55

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF THE ABOVE SPECIFICATION.THE INSPECTION CERTIFICATE 3.1.B IS ISSUED IN ACCORDANCE WITH ISO 10474:1991.

QUALITY ASSURANCE DEP.

TENSION STEEL INDUSTRIES CO., LTD

9/F., NO. 127, SEC. 2, CHIEN KUO N. ROAD, TAIPEI 104 TAIWAN
TEL:(02)2500-6206 FAX:(02)2508-0398

MILL TEST CERTIFICATE

SOLD TO		CERTIFICATE NO.	17051801	ISSUE DATE	MAY.18.2017
COMMODITY	PRODUCT: PRIME NEWLY PRODUCED ERW BPE CASING			SHIPPING DATE	MAY.29.2017
SPECIFICATION	MATERIAL PRODUCED ACCORDING TO API 5CT J55 PSL1. MATERIAL TO BE COATED WITH MILLS LACQUER (NO LACQUER / OIL ON THE ID OF THE MATERIAL). ITEM 2 /			INVOICE NO.	TT17051201

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION	QUANTITY		TENSILE ※1 Y.S.	TENSILE ※1 T.S. BODY	TENSILE ※1 T.S. WELD	TENSILE ※1 EL.	HYDROSTATIC TEST 6SEC	OTHER TEST ※2	CHEMICAL COMPOSITION % C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	Ti	V		C.E. ※3	REMARK
		O.D.×THICKNESS×LENGTH	PCS/T		MPa				psi		x10²	x10²	x10²	x10³	x10³	x10²				x10³						
D170414019-001	4DK63	9-5/8"×0.395"×42'	32	23.755	501	561	—	30.0	3600	GOOD	16	97	15	17	3	1	1	2	Tr	25	15	3	1			
											15	97	15	17	3	1	1	2	Tr	24	16	3	1			
D170414019-001	4DK65	9-5/8"×0.395"×42'	166	123.227	479	556	—	32.6	3600	GOOD	14	102	14	14	4	1	1	2	Tr	27	14	2	1			
											14	102	14	14	5	1	1	2	Tr	27	14	2	1			
D170414019-001	4DK72	9-5/8"×0.395"×42'	295	218.988	484	556	—	32.6	3600	GOOD	15	97	14	14	2	1	1	2	Tr	29	15	2	1			
					495	567	—	32.0			14	97	15	14	2	1	1	2	Tr	28	14	2	1			
D170414019-001	4DK73	9-5/8"×0.395"×42'	325	241.258	491	563	—	31.0	3600	GOOD	14	97	15	12	2	1	1	2	Tr	25	16	2	2			
					485	560	—	34.0			15	98	16	13	2	1	1	2	Tr	25	16	2	2			
D170414019-001	4DK74	9-5/8"×0.395"×42'	274	203.399	457	554	—	30.0	3600	GOOD	14	97	14	15	3	Tr	1	2	Tr	23	15	2	1			
					485	564	—	32.4			15	97	15	17	3	Tr	1	2	Tr	23	14	2	1			
D170414019-001	4DK48	9-5/8"×0.395"×42'	33	24.498	486	564	—	32.0	3600	GOOD	15	97	15	17	2	1	1	2	Tr	28	15	2	1			
											14	98	15	18	3	Tr	1	2	Tr	28	16	2	1			
		TOTAL	1125	835.125																						

※2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

ISSUED BY : TENSION STEEL INDUSTRIES CO., LTD, TAIWAN, R.O.C.
PURCHASE ORDER NUMBER: 71400
LETTER OF CREDIT NUMBER: IC5015233US

NOTES

HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT
※1 TENSILE TEST – ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM
※3 – C.E. : CARBON EQUIVLENT ※4 – F+P:F-FERRITE P-PEARLITE ※5 – IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×5×55
Tr. : TRACE ELEMENT WITH ITS CONTENT CONFORMING TO THE SPECIFICTION REQUIREMENTS.

TENSION STEEL INDUSTRIES CO., LTD.

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF API 5CT 8th ED. & ISO 10474

Pao-lien Chen

TENSION STEEL INDUSTRIES CO., LTD

9F, NO. 127 SEC 2 CHINE KUO N. ROAD,TAIPEI. TAIWAN, R.O.C.
TEL:(02)2500-6206 FAX:(02)2508-0398

MILL TEST REPORT

CERTIFICATE NO.	17041802	ISSUE DATE	APR.18.2017
ORDER NO.	TS105121502	SHIPPING DATE	APR.26.2017
CUSTOMER NO.	W0059	INVOICE NO.	TT17041901

COMMODITY: PRIME NEWLY PRODUCED ERW STEEL PIPE, BLACK, PLAIN END

SPECIFICATION: API 5CT-9th J55 PSL1

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION O.D.×THICKNESS×LENGTH	QUANTITY PCS/T		TENSILE ※1 Y.S.	T.S. BODY	T.S. WELD	EL.	HYDROSTATIC TEST 6SEC	OTHER TEST ※2	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	Ti	V		C.E. ※3	REMARK
					MPa				psi		x10²	x10²	x10²	x10³	x10³	x10²				x10³						
D170405003-001	2W556	9-5/8"×0.395"×42'	103	76.460	509	574	—	27.2	3600	GOOD	15	100	15	13	5	Tr	1	2	Tr	20	12	2	2			
											15	100	14	14	5	Tr	1	2	Tr	19	13	2	2			
D170405003-001	2W559	9-5/8"×0.395"×42'	32	23.755	475	543	—	28.4	3600	GOOD	17	105	16	12	2	Tr	1	2	Tr	20	14	1	2			
											17	105	16	12	3	Tr	1	2	Tr	20	14	1	2			
D170324030-001	4DE94	9-5/8"×0.395"×42'	293	217.504	465	544	—	32.4	3600	GOOD	15	108	15	14	4	1	1	3	Tr	23	14	2	2			
					497	564	—	30.4			16	107	15	14	4	1	1	3	Tr	23	15	2	2			
D170324030-001	4DE95	9-5/8"×0.395"×42'	64	47.509	524	579	—	29.8	3600	GOOD	15	103	15	18	3	1	1	2	Tr	34	15	2	2			
											14	104	16	18	2	1	1	2	Tr	36	15	2	2			
D170405003-001	4DF03	9-5/8"×0.395"×42'	64	47.509	485	538	—	28.4	3600	GOOD	14	97	14	13	2	Tr	1	1	Tr	39	16	3	1			
											14	97	15	13	3	Tr	1	1	Tr	39	15	3	1			
D170405003-001	4DF15	9-5/8"×0.395"×42'	98	72.749	475	540	—	31.0	3600	GOOD	13	99	14	12	2	1	1	2	Tr	22	13	1	1			
											14	99	14	12	3	1	1	2	Tr	22	14	1	1			
		TOTAL	654	485.486																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST 8.750"	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

NOTES

HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT
※1 TENSILE TEST - ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM
※3-C.E. : CARBON EQUIVLENT ※4-F+P:F-FERRITE P-PEARLITE ※5-IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF EN 10204 & ISO 10474.

QUALITY ASSURANCE DEP.

Amin Jan

TENSION STEEL INDUSTRIES CO., LTD

9F. NO. 127 SEC 2 CHIEN KUO N. ROAD,TAIPEI. TAIWAN, R.O.C.
TEL:(02)2500-6206 FAX:(02)2508-0398

MILL TEST REPORT

SOLD TO		CERTIFICATE NO.	19032503	ISSUE DATE	MAR.25.2019
COMMODITY	PRIME NEWLY PRODUCED ERW STEEL PIPE, BLACK, PLAIN END	ORDER NO.	D18120303S	SHIPPING DATE	MAR.31.2019
SPECIFICATION	API 5CT-9th J55 PSL1			INVOICE NO.	TPE2019041501

LOT NO.	HEAT NO.	MATERIAL DESCRIPTION	QUANTITY		TENSILE ※1 Y.S. Rt0.5	TENSILE ※1 T.S. BODY	TENSILE ※1 T.S. WELD	TENSILE ※1 EL.	HYDROSTATIC TEST 6SEC	OTHER TEST ※2	CHEMICAL COMPOSITION % C	Mn	Si	P	S	Cu	Ni	Cr	Mo	Al	Nb	V	Ti		C.E. ※3	REMARK
		O.D.×THICKNESS×LENGTH	PCS/T		MPa				psi		x10²	x10²	x10²	x10³	x10³	x10²				x10³						
D190306001-001	4HW28	9-5/8"×0.395"×42'	95	70.522	480	559	—	33.6	3600	GOOD	15	99	13	20	2											
											14	99	13	20	2											
D190306001-001	4HW55	9-5/8"×0.395"×42'	165	122.485	471	558	—	33.6	3600	GOOD	15	101	15	10	2											
											15	100	15	10	2											
D190306001-001	6M295	9-5/8"×0.395"×42'	100	74.233	480	556	—	32.0	3600	GOOD	15	104	10	19	3											
											16	104	10	20	3											
		TOTAL	360	267.240																						

※ 2 DESCRIPTION OF TEST	VISUAL	DRIFT TEST	METALLO-GRAPHIC EXAM	FLATTENNING TEST	ULTRASONIC TEST	LOCATION OF TENSIL	THREADS
RESULT	GOOD	GOOD	F+P ※4	GOOD	GOOD	■L □T □W	-

Manufacturer:
TENSION STEEL INDUSTRIES CO., LTD.

NOTES

HEAT TREATMENT / DELIVERY CONDITION : WELD SEAM HEAT TREATMENT
※1 TENSILE TEST - ELONGATION RESULT SPECIMEN TYPE: STRIP WIDTH: 38.10MM G.L.:50.8mm
※3 - C.E. : CARBON EQUIVLENT ※4 - F+P:F-FERRITE P-PEARLITE ※5 - IMPACT : C1-10×10×55 C2-10×7.5×55 C3-10×5×55
Tr:TRACE ELEMENT WITH ITS CONTENT CONFORMING TO THE SPECIFICATION REQUIREMENTS,

SURVEYOR TO

WE HEREBY CERRTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENT OF THE ABOVE SPECIFICATION.THE INSPECTION CERTIFICATE 3.1.B IS ISSUED IN ACCORDANCE WITH ISO 10474:1991.

QUALITY ASSURANCE DEP.

imin Jan

鑫陽鋼鐵股份有限公司
SHIN YANG STEEL CO.,LTD.

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TEL:+886-7-6125177,
FAX:+886-7-6126325

品 質 證 明 書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口焊鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.		正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	JN495	SDSTC1953087367	13.00	13.00	96.00	15.00	4.00	2.0	2.0	3.0	22.00	Tr.	19.00	2.00	1.00	H
					JN495	SDSTC1953087367	11.50	10.70	95.80	13.20	3.20	0.8	0.9	1.8	23.90	Tr.	17.10	2.10	Tr.	P
					JN495	SDSTC1953087367	11.80	12.70	95.70	13.60	3.10	0.8	1.0	1.8	23.90	Tr.	18.90	1.98	Tr.	P
					JQ584	SDSTC1953093539	13.00	12.00	93.00	16.00	3.00	1.0	1.0	2.0	23.00	Tr.	17.00	1.00	Tr.	H
					JQ584	SDSTC1953093539	11.60	11.30	94.30	18.00	2.70	1.3	0.7	2.0	29.80	Tr.	17.90	1.70	Tr.	P
					JQ584	SDSTC1953093539	11.20	13.90	93.60	17.50	3.00	1.3	0.7	2.0	22.10	Tr.	19.20	1.60	Tr.	P
					JQ585	SDSTC1953093706	13.00	14.00	93.00	14.00	3.00	2.0	1.0	2.0	24.00	Tr.	20.00	1.00	Tr.	H
					JQ585	SDSTC1953093706	11.50	13.00	92.70	13.20	1.50	1.4	0.6	1.9	23.90	Tr.	20.80	1.50	Tr.	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≤250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

鑫陽鋼鐵股份有限公司
SHIN YANG STEEL CO.,LTD.

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品質證明書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱乳平口鋅鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt%① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	JQ585	SDSTC1953093706	11.70	12.30	92.10	12.80	1.40	1.4	0.6	1.9	25.90	Tr.	19.50	1.50	Tr.	P
					JQ586	SDSTC1963093716	13.00	12.00	96.00	15.00	2.00	1.0	1.0	2.0	20.00	Tr.	17.00	1.00	Tr.	H
					JQ586	SDSTC1963093716	11.80	10.60	96.30	15.30	2.30	1.4	0.6	2.0	19.00	0.18	17.80	1.60	0.23	P
					JQ586	SDSTC1963093716	11.90	11.70	97.10	15.50	2.50	1.4	0.7	2.0	18.00	0.19	18.80	1.60	0.24	P
					JQ886	SDSTC1963099402	14.00	14.00	97.00	16.00	4.00	2.0	1.0	3.0	24.00	Tr.	17.00	1.00	1.00	H
					JQ886	SDSTC1963099402	14.20	11.80	97.60	14.90	4.20	2.2	0.5	2.9	24.80	0.18	17.50	1.60	Tr.	P
					JQ886	SDSTC1963099402	14.30	12.60	97.50	14.70	3.90	2.2	0.5	2.8	24.40	0.20	18.00	1.30	Tr.	P
					KM885	SDSTC1963093753	13.00	13.00	94.00	14.00	3.00	2.0	1.0	2.0	20.00	Tr.	18.00	1.00	Tr.	H

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≤250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口好鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.		正常化熱處理 NORMALIZING		940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	KM885	SDSTC1963093753	12.70	11.80	94.00	12.00	2.60	2.6	0.7	2.4	22.60	0.27	18.40	2.20	Tr.	P
					KM885	SDSTC1963093753	12.70	13.30	93.50	12.10	2.60	2.6	0.7	2.4	19.60	0.31	19.10	2.10	Tr.	P
					KM886	SDSTC1953093722	13.00	14.00	97.00	14.00	3.00	2.0	1.0	2.0	21.00	Tr.	21.00	2.00	1.00	H
					KM886	SDSTC1953093722	11.60	12.60	95.60	13.80	1.40	1.7	0.4	2.4	19.90	Tr.	18.50	1.90	0.14	P
					KM886	SDSTC1953093722	12.40	12.50	96.50	13.70	1.60	1.7	0.5	2.3	21.60	Tr.	19.20	1.80	0.13	P
					KM887	SDSTC1963094056	14.00	15.00	96.00	14.00	3.00	2.0	1.0	2.0	23.00	Tr.	20.00	2.00	Tr.	H
					KM887	SDSTC1963094056	13.20	13.40	94.20	12.50	2.80	2.0	0.7	2.3	20.00	0.33	19.50	2.00	Tr.	P
					KM887	SDSTC1963094056	13.10	13.90	96.50	12.60	2.60	2.0	0.7	2.3	21.20	0.26	20.40	2.00	Tr.	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≦250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

注釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
①CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ②H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③NDT.= NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	無軋平口焊鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	KM888	SDSTC1953093552	14.00	15.00	96.00	14.00	3.00	2.0	1.0	3.0	19.00	Tr.	19.00	1.00	Tr.	H
					KM888	SDSTC1953093552	12.20	13.80	96.30	12.10	1.90	2.1	0.8	3.1	23.00	Tr.	17.50	2.30	0.25	P
					KM888	SDSTC1953093552	12.90	12.10	96.40	15.00	3.00	2.1	0.5	3.2	21.90	Tr.	14.70	2.10	0.36	P
					LA413	SDSTC1953092407	15.00	15.00	96.00	9.00	2.00	2.0	1.0	2.0	32.00	Tr.	20.00	1.00	1.00	H
					LA413	SDSTC1953092407	14.50	15.00	97.50	9.10	1.30	1.7	0.5	1.7	31.10	Tr.	22.10	1.00	Tr.	P
					LA413	SDSTC1953092407	14.60	14.90	97.90	9.80	1.40	1.7	0.5	1.7	30.90	Tr.	22.80	1.20	Tr.	P
					LA801	SDSTC1963094052	12.00	12.00	93.00	14.00	2.00	2.0	1.0	2.0	18.00	Tr.	19.00	1.00	Tr.	H
					LA801	SDSTC1963094052	11.30	10.70	94.80	13.30	2.50	1.8	0.8	2.2	18.40	0.23	19.50	2.10	Tr.	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≤250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

注釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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品質證明書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1970002	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/07/04
商品名稱 COMMODITY	+TERMS OF PRICE : CFR LO HOUSTON, TX +ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITION) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP90A6	發票號碼 INVOICE_NO	FUP90A6	交運日期 DELIVERY DATE	2019/06/18
		產品名稱 PRODUCT	熱軋平口鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	LA801	SDSTC1963094052	12.40	10.50	95.30	14.60	2.60	1.8	0.8	2.3	18.40	0.25	19.50	1.90	Tr.	P
					LA802	SDSTC1963094061	13.00	14.00	92.00	14.00	2.00	1.0	Tr.	2.0	20.00	Tr.	18.00	1.00	Tr.	H
					LA802	SDSTC1963094061	13.00	12.60	94.10	13.80	1.90	1.0	0.3	2.1	19.80	Tr.	17.40	1.60	0.21	P
					LA802	SDSTC1963094061	12.80	11.80	93.50	13.70	1.60	1.0	0.4	2.1	18.70	Tr.	18.50	1.60	0.10	P
					LA803	SDSTC1953093580	13.00	14.00	94.00	14.00	2.00	1.0	1.0	3.0	21.00	Tr.	20.00	1.00	Tr.	H
					LA803	SDSTC1953093580	13.60	14.60	96.70	13.70	1.80	2.0	0.8	2.8	20.10	0.24	18.70	1.50	0.33	P
					LA803	SDSTC1953093580	13.30	14.50	95.30	13.00	2.10	1.9	0.8	2.8	19.60	0.24	17.70	1.20	0.33	P
					LA804	SDSTC1953094832	14.00	13.00	92.00	12.00	3.00	2.0	1.0	3.0	22.00	Tr.	19.00	1.00	Tr.	H

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≦250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 銅管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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		產品名稱 PRODUCT	熱軋平口焊鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	LA804	SDSTC1953094832	12.40	11.80	93.10	11.90	2.20	1.5	0.6	3.2	20.90	0.40	21.00	1.00	Tr.	P
					LA804	SDSTC1953094832	14.10	13.00	93.40	11.50	2.70	1.5	0.6	3.2	23.00	0.39	21.30	1.40	Tr.	P
					LA805	SDSTC1953094824	13.00	14.00	93.00	13.00	2.00	1.0	1.0	2.0	19.00	Tr.	19.00	1.00	Tr.	H
					LA805	SDSTC1953094824	12.50	13.70	91.80	13.00	2.30	1.2	0.7	2.8	18.90	0.53	21.20	1.20	Tr.	P
					LA805	SDSTC1953094824	12.50	15.20	91.50	13.00	2.00	1.2	0.5	2.8	18.50	0.37	21.80	1.10	Tr.	P
					LA828	SDSTC1963093735	14.00	12.00	91.00	12.00	2.00	2.0	1.0	2.0	16.00	Tr.	19.00	1.00	Tr.	H
					LA828	SDSTC1963093735	13.20	12.70	92.00	12.30	1.90	1.3	0.7	2.1	19.40	Tr.	21.70	1.20	Tr.	P
					LA828	SDSTC1963093735	12.80	12.40	92.40	12.40	1.90	1.3	0.7	2.1	19.00	Tr.	22.20	1.30	Tr.	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≦250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
①CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ②H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③NDT.= NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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		產品名稱 PRODUCT	熱軋平口焊鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt%① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	LA938	SDSTC1963099403	13.00	12.00	98.00	13.00	3.00	1.0	Tr.	1.0	31.00	Tr.	18.00	1.00	Tr.	H
					LA938	SDSTC1963099403	13.10	10.00	98.50	12.80	2.70	0.7	0.3	1.6	33.90	Tr.	16.70	1.50	Tr.	P
					LA938	SDSTC1963099403	13.50	8.98	98.60	15.40	4.80	0.7	0.1	1.6	31.50	Tr.	13.50	1.70	Tr.	P
					LA942	SDSTC1963098771	13.00	13.00	91.00	12.00	2.00	1.0	2.0	2.0	38.00	Tr.	18.00	1.00	Tr.	H
					LA942	SDSTC1963098771	11.70	12.10	92.70	12.20	1.50	1.1	1.2	2.3	36.80	0.22	17.30	1.80	Tr.	P
					LA942	SDSTC1963098771	12.20	11.70	92.80	13.20	2.20	1.1	1.0	2.3	36.50	0.12	15.60	1.90	Tr.	P
					LB088	SDSTC1963098770	15.00	15.00	102.00	11.00	3.00	1.0	Tr.	1.0	24.00	Tr.	15.00	2.00	Tr.	H
					LB088	SDSTC1963098770	15.20	12.70	103.00	12.60	2.40	1.0	0.1	1.7	22.60	Tr.	14.20	2.10	Tr.	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≦250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
①CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ②H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③NDT.= NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 銅管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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		產品名稱 PRODUCT	熱軋平口鋅鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB9600700	13-3/8"x0.380"x42'	1050	1055844	LB088	SDSTC1963098770	14.30	13.50	102.00	11.20	2.40	1.0	0.3	1.7	21.20	Tr.	15.60	1.60	Tr.	P
					LB283	SDSTC1963101337	13.00	13.00	92.00	10.00	2.00	2.0	1.0	2.0	18.00	Tr.	16.00	1.00	Tr.	H
					LB283	SDSTC1963101337	11.10	11.80	94.50	9.40	1.40	1.7	0.8	2.2	16.30	0.23	18.00	1.40	0.16	P
					LB283	SDSTC1963101337	11.20	11.20	94.40	9.20	1.60	1.7	0.7	2.2	15.60	0.21	16.80	1.50	0.20	P
					LB288	SDSTC1963101476	13.00	14.00	97.00	11.00	2.00	2.0	1.0	2.0	22.00	Tr.	19.00	1.00	Tr.	H
					LB288	SDSTC1963101476	11.60	11.70	96.30	10.10	6.40	2.2	0.7	2.4	19.40	0.16	18.40	1.70	0.28	P
					LB288	SDSTC1963101476	11.70	12.60	96.30	10.30	6.90	2.2	0.7	2.4	19.00	0.17	18.60	1.70	0.21	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	硬度 HARDNESS (HV)	衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D				≤250HV										
PB9600700	63670	76724	33	OK	12.46	OK	OK	OK	OK											

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82544高雄市橋頭區芋寮里芋寮路297號
No. 297, Yuliao Road, Qiaotou District,
Kaohsiung City 82544, Taiwan (R.O.C.)
TEL:+886-7-6125177,
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品 質 證 明 書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1910012	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/01/23
商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	JK025	SDSTC1893021384	13.00	14.00	95.00	17.00	2.00	1.0	1.0	2.0	17.00	Tr.	20.00	1.00	1.00	H
					JK025	SDSTC1893021384	11.30	11.60	94.20	20.30	2.80	0.6	1.0	1.7	12.10	0.09	18.00	1.30	0.47	P
					JK025	SDSTC1893021384	11.40	11.50	94.00	20.10	2.70	0.6	1.0	1.7	12.10	0.09	18.80	1.20	0.59	P
					JK026	SDSTC1893021540	13.00	16.00	95.00	15.00	3.00	2.0	2.0	2.0	20.00	Tr.	19.00	2.00	1.00	H
					JK026	SDSTC1893021540	13.00	15.20	92.00	17.00	3.40	1.3	1.2	2.2	18.00	0.15	18.10	2.40	0.66	P
					JK026	SDSTC1893021540	12.80	15.60	91.60	16.40	3.10	1.2	1.2	2.1	18.50	0.18	18.80	2.40	0.36	P
					JK028	SDSTC1893021283	13.00	14.00	98.00	14.00	3.00	1.0	1.0	1.0	21.00	Tr.	18.00	2.00	1.00	H
					JK028	SDSTC1893021283	12.70	11.90	96.50	15.40	3.50	0.8	0.9	1.5	17.10	Tr.	19.40	2.30	0.67	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT.= NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Heng Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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		產品名稱 PRODUCT	熱軋平口鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.			正常化熱處理 NORMALIZING	940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	JK028	SDSTC1893021283	12.90	11.50	96.80	15.40	3.20	0.9	1.0	1.5	17.40	Tr.	19.50	2.30	0.68	P
					JK032	SDSTC1893021495	13.00	14.00	97.00	15.00	2.00	1.0	1.0	2.0	15.00	Tr.	19.00	2.00	1.00	H
					JK032	SDSTC1893021495	12.20	12.00	95.40	17.00	2.40	0.7	0.9	1.9	12.60	1.00	18.50	2.20	0.35	P
					JK032	SDSTC1893021495	12.40	11.80	95.40	16.50	2.30	0.7	1.0	1.9	12.20	1.00	19.30	2.20	0.58	P
					JK033	SDSTC1893021543	13.00	13.00	97.00	11.00	2.00	1.0	1.0	4.0	17.00	1.00	18.00	1.00	Tr.	H
					JK033	SDSTC1893021543	11.90	11.80	92.80	12.50	3.00	0.9	0.9	3.4	15.20	0.72	17.70	1.80	Tr.	P
					JK033	SDSTC1893021543	11.80	11.50	93.10	12.60	3.20	0.9	0.9	3.4	15.30	0.68	17.40	1.80	Tr.	P
					JK034	SDSTC1893021545	15.00	12.00	98.00	13.00	2.00	1.0	1.0	4.0	15.00	1.00	20.00	1.00	Tr.	H

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
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		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	JK034	SDSTC1893021545	12.40	9.98	93.50	11.80	2.30	1.3	1.2	2.0	14.40	0.19	18.70	1.60	0.42	P
					JK034	SDSTC1893021545	12.30	9.77	92.60	12.00	2.30	1.3	1.1	2.0	14.80	0.22	17.30	1.30	0.24	P
					KG676	SDSTC1893021451	14.00	15.00	96.00	13.00	3.00	2.0	2.0	2.0	22.00	Tr.	19.00	2.00	1.00	H
					KG676	SDSTC1893021451	12.60	12.80	94.50	14.50	3.30	1.4	1.7	2.7	16.70	0.11	18.30	1.90	Tr.	P
					KG676	SDSTC1893021451	12.40	12.50	94.20	14.40	3.10	1.4	1.8	2.7	16.70	0.14	18.80	2.20	Tr.	P
					KG677	SDSTC1893021485	14.00	15.00	100.00	13.00	2.00	2.0	2.0	2.0	21.00	Tr.	20.00	2.00	1.00	H
					KG677	SDSTC1893021485	12.10	12.90	94.80	17.20	3.20	1.9	1.7	2.5	17.70	0.22	19.60	2.70	0.17	P
					KG677	SDSTC1893021485	12.40	12.50	96.70	17.40	2.90	1.9	1.6	2.6	18.10	0.17	19.30	3.10	0.41	P

批號 LOT NO.	機械性質 TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗 IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
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		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	KG678	SDSTC1893021381	12.00	14.00	94.00	14.00	2.00	1.0	2.0	2.0	20.00	Tr.	19.00	2.00	1.00	H
					KG678	SDSTC1893021381	12.30	12.60	91.20	16.50	3.30	1.2	1.5	2.5	18.60	0.15	20.00	2.30	0.26	P
					KG678	SDSTC1893021381	12.30	12.10	91.50	16.40	3.10	1.1	1.5	2.5	18.60	0.15	19.60	2.70	0.26	P
					KG696	SDSTC1893021437	13.00	15.00	96.00	13.00	2.00	1.0	1.0	2.0	22.00	Tr.	19.00	1.00	1.00	H
					KG696	SDSTC1893021437	12.60	13.40	96.00	14.20	3.40	0.6	0.6	2.2	12.50	0.20	18.90	1.40	0.14	P
					KG696	SDSTC1893021437	12.80	12.60	96.50	14.50	3.30	0.6	0.6	2.2	12.60	0.14	18.60	1.50	0.14	P
					KG697	SDSTC1893021446	13.00	15.00	99.00	14.00	2.00	1.0	1.0	2.0	22.00	Tr.	18.00	1.00	Tr.	H
					KG697	SDSTC1893021446	12.30	13.30	95.90	13.20	2.90	0.8	0.7	1.8	18.60	0.14	18.60	1.30	0.05	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

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							2	2	2	3	3	2	2	2	2	2	3	3	3	
1	PB890070E	13-3/8"x0.380"x42'	6	6033	KG697	SDSTC1893021446	12.40	12.70	95.60	13.00	2.70	0.8	0.6	1.8	19.10	0.10	18.20	1.80	0.05	P
					PV510	SDSTC1893021450	12.00	12.00	94.00	15.00	3.00	2.0	2.0	3.0	22.00	Tr.	21.00	2.00	Tr.	H
					PV510	SDSTC1893021450	12.50	10.30	92.60	17.00	3.20	0.6	0.8	3.4	11.40	0.69	18.80	1.50	0.38	P
					PV510	SDSTC1893021450	12.30	10.60	92.50	16.80	2.80	0.6	0.8	3.5	10.80	0.78	19.60	1.40	0.22	P
					PV511	SDSTC1893021496	13.00	12.00	94.00	13.00	3.00	2.0	1.0	3.0	22.00	Tr.	19.00	2.00	Tr.	H
					PV511	SDSTC1893021496	12.50	11.80	91.20	13.20	3.00	1.8	1.1	2.8	23.50	0.23	19.00	2.10	0.30	P
					PV511	SDSTC1893021496	12.60	12.00	91.60	13.50	2.80	1.8	1.1	2.8	23.40	0.22	19.10	2.70	0.28	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB890070E	65121	78609	32	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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FAX:+886-7-6126325

品質證明書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1910012	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/01/23
商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.		正常化熱處理 NORMALIZING		940-960℃

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	JL906	SDSTC18C3045867	13.00	13.00	96.00	12.00	3.00	2.0	1.0	2.0	19.00	Tr.	18.00	2.00	1.00	H
					JL906	SDSTC18C3045867	10.80	12.50	96.20	11.20	3.40	2.2	0.6	2.0	16.80	0.44	16.40	1.60	0.42	P
					JL906	SDSTC18C3045867	10.80	12.90	94.90	10.20	3.20	2.2	0.6	2.0	17.00	0.54	15.30	1.80	0.25	P
					JL907	SDSTC18C30457462	13.00	13.00	96.00	13.00	3.00	2.0	1.0	2.0	19.00	Tr.	18.00	2.00	1.00	H
					JL907	SDSTC18C30457462	12.40	12.80	96.40	13.30	3.20	2.0	0.4	2.2	17.20	0.46	15.40	1.80	Tr.	P
					JL907	SDSTC18C30457462	12.90	13.70	96.00	12.20	3.00	2.1	0.5	2.2	17.30	0.48	15.80	1.70	Tr.	P
					JM046	SDSTC18C3045889	13.00	12.00	93.00	16.00	3.00	1.0	1.0	2.0	21.00	Tr.	21.00	1.00	1.00	H
					JM046	SDSTC18C3045889	10.20	10.00	90.40	17.00	3.50	1.0	0.6	1.9	20.70	0.20	16.80	1.60	0.18	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT.= NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

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		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt%① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	JM046	SDSTC18C3045889	10.40	11.20	90.20	16.40	2.70	0.9	0.7	1.9	17.20	0.20	17.50	1.40	0.18	P
					JM102	SDSTC18C3048528	14.00	12.00	96.00	17.00	4.00	1.0	1.0	1.0	16.00	Tr.	18.00	2.00	1.00	H
					JM102	SDSTC18C3048528	12.10	11.00	97.50	15.80	2.00	1.2	0.7	1.7	16.60	0.22	19.20	2.10	0.47	P
					JM102	SDSTC18C3048528	11.40	10.80	97.60	16.90	2.70	1.2	0.7	1.7	17.10	0.35	18.70	2.20	0.36	P
					JM215	SDSTC18C3047605	14.00	15.00	95.00	13.00	2.00	1.0	1.0	2.0	18.00	Tr.	17.00	1.00	Tr.	H
					JM215	SDSTC18C3047605	12.80	14.30	92.00	15.10	1.50	0.8	0.6	1.9	20.70	Tr.	15.40	2.00	Tr.	P
					JM215	SDSTC18C3047605	13.70	13.90	92.60	18.50	2.50	0.9	0.3	2.0	20.20	Tr.	14.40	2.00	Tr.	P
					JM313	SDSTC18C3047594	15.00	13.00	98.00	14.00	2.00	1.0	1.0	2.0	19.00	Tr.	16.00	1.00	Tr.	H

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D													
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK										

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
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		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	JM313	SDSTC18C3047594	13.00	12.80	94.40	14.80	2.80	0.6	0.6	1.7	15.90	Tr.	16.30	2.00	Tr.	P
					JM313	SDSTC18C3047594	13.20	13.30	93.70	13.70	2.60	0.6	0.5	1.7	16.60	Tr.	14.50	1.90	Tr.	P
					JM314	SDSTC18C3047610	14.00	12.00	96.00	17.00	2.00	1.0	1.0	2.0	18.00	Tr.	18.00	2.00	1.00	H
					JM314	SDSTC18C3047610	12.30	11.10	97.80	16.90	1.70	0.8	0.4	1.6	16.00	Tr.	14.70	1.40	0.79	P
					JM314	SDSTC18C3047610	12.30	10.00	98.00	17.30	1.70	0.8	0.5	1.6	17.00	Tr.	16.30	1.80	0.74	P
					JM315	SDSTC18C3047613	13.00	12.00	96.00	14.00	3.00	1.0	1.0	2.0	18.00	Tr.	17.00	1.00	Tr.	H
					JM315	SDSTC18C3047613	12.40	11.30	95.60	17.40	2.80	0.6	0.6	1.7	15.90	0.08	16.30	2.00	Tr.	P
					JM315	SDSTC18C3047613	12.40	10.40	95.70	18.10	2.60	0.6	0.5	1.7	16.60	0.08	14.50	1.90	Tr.	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK											

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
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		產品名稱 PRODUCT	熱軋平口焊鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.		正常化熱處理 NORMALIZING	940-960℃	

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt% ① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS ②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	PX035	SDSTC18C3047597	13.00	12.00	94.00	11.00	2.00	1.0	1.0	2.0	17.00	Tr.	21.00	2.00	1.00	H
					PX035	SDSTC18C3047597	10.80	11.10	93.90	13.40	2.20	1.1	0.7	2.0	16.30	0.29	20.30	2.50	0.27	P
					PX035	SDSTC18C3047597	10.70	10.10	95.70	12.60	2.20	1.1	0.7	2.0	16.10	0.33	20.30	2.30	0.26	P
					PX037	SDSTC18C3047759	12.00	12.00	94.00	13.00	2.00	1.0	1.0	2.0	18.00	Tr.	21.00	2.00	1.00	H
					PX037	SDSTC18C3047759	10.80	11.10	93.90	13.40	2.20	1.1	0.7	2.0	16.30	0.29	20.30	2.50	0.27	P
					PX037	SDSTC18C3047759	10.70	11.00	95.70	12.60	2.20	1.1	0.7	2.0	16.10	0.33	20.30	2.30	0.26	P
					PX038	SDSTC18C3048527	13.00	12.00	96.00	14.00	2.00	1.0	1.0	2.0	17.00	Tr.	19.00	2.00	1.00	H
					PX038	SDSTC18C3048527	12.50	12.80	94.50	12.90	3.40	1.1	0.4	1.7	22.40	0.41	17.60	2.70	0.29	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT. ③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE		衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D														
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK											

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Kaohsiung City 82544, Taiwan (R.O.C.)
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FAX:+886-7-6126325

品 質 證 明 書
INSPECTION CERTIFICATE

客戶名稱 CLIENT		證明書編號 CERTIFICATE NO.	AF1910012	證書證號 LICENSE NO.	API Spec 5CT0693	開立日期 ISSUE DATE	2019/01/23
商品名稱 COMMODITY	+ TERMS OF PRICE : CFR LO HOUSTON, TX + COUNTRY OF ORIGIN : TAIWAN COMMODITY : PRIME NEWLY PRODUCED ERW CARBON STEEL PIPE CASING ACCORDING TO API 5CT (AS PER API 5CT LATEST EDITON) PLAIN END, SQUARE CUT, NO END CAPS WITH MILL'S VARNISH COATING	訂單號碼 ORDER ITEM NO.	FUP8131	發票號碼 INVOICE_NO	FUP8131A	交運日期 DELIVERY DATE	2018/12/19
		產品名稱 PRODUCT	熱軋平口銲鋼管 CARBON STEEL E.R.W. PIPE WITH LACQUER COATING, PLAIN ENDS	用途 APPLICATION	FOR CASING		
		產品規格 SPECIFICATION	API 5CT J55 E.R.W. PSL1 (2012) THE ELECTRIC-WELDED CASING OR TUBING PLAIN END AT GROUP 1 , J55/PSL 1 , BLACK STEEL PIPE.	正常化熱處理 NORMALIZING	940-960℃		

項次 ITEM NO.	批號 LOT. NO.	訂單尺寸 ORDERED DIMENSIONS 管徑*厚度*長度 OD*THICKNESS*LENGTH	數量 QUANTITY (pcs)	重量 WEIGHT (kg)	爐號 HEAT NO.	原料號碼 MATERIAL NO.	化學成分 CHEMICAL COMPOSITION wt%① C	Si	Mn	P	S	Cu	Ni	Cr	AL	Mo	Nb	Ti	V	備註 REMARKS②
							2	2	2	3	3	2	2	2	2	2	3	3	3	
2	PB8C00400	13-3/8"x0.380"x42'	443	445466	PX038	SDSTC18C3048527	12.60	12.20	94.40	12.70	7.40	1.1	0.3	1.7	19.30	0.32	18.80	2.40	0.37	P
					PX089	SDSTC18C3046340	13.00	15.00	94.00	15.00	2.00	2.0	1.0	2.0	20.00	Tr.	21.00	2.00	1.00	H
					PX089	SDSTC18C3046340	10.60	12.80	91.40	16.90	2.50	1.9	0.8	2.2	17.90	0.27	18.50	2.80	0.58	P
					PX089	SDSTC18C3046340	10.40	13.20	91.00	16.10	2.50	1.9	0.8	2.2	18.30	0.20	18.10	2.70	0.15	P

批號 LOT NO.	機械性質TENSILE TEST 降伏強度 Y.S. (psi)	抗拉強度 T.S. (psi)	伸長率 EL. (%)	水壓試驗 HYDROSTATIC TEST (psi) HOLD TIME	通徑測試 DRIFT TEST (in)	壓扁試驗 FLATTENING TEST	探傷檢測 NDT.③	表面與尺寸 SURFACE & DIMENSION	金相組織 METALLOGRAPHIC STRUCTURE	衝擊試驗IMPACT TEST PIPE BODY ☐ LONGITUDINAL ☐ TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)	PIPE WELD SEAM TRANSVERSE ABSORBED ENERGY (J) 1	2	3	AVE.	TEMP. (℃)
規格值 SPECIFICATION	55000 min. 80000 max.	75000 min.	23 min.	2500 5 sec.		0.60D													
PB8C00400	61350	76724	36	OK	12.46	OK	OK	OK	OK										

註釋NOTE	說明 DESCRIPTION	簽署人 COMPANY REPRESENTATIVE
① CHEMICAL COMPOSITION : 2=x100 3=x1,000 4=x10,000 ② H : HEAT ANALYSIS 鋼液分析 P : PRODUCT ANALYSIS 製品分析 ③ NDT. = NONDESTRUCTIVE TEST	We hereby certify that the products described herein have been manufactured, sampled, tested and inspected in accordance with the relevant specification and the contract and have been found meeting those requirements. If you have any questions, please make contact with us. The inspection certificate 3.1 B is issued in accordance with ISO 10474:1991.	Chia Hung Yao 鋼管技術部副理 DEPUTY GENERAL MANAGER-PIPE TECHNOLOGY DIVISION

INSPECTION CERTIFICATE

P/O No. : P10125
L/C No. : HU20110829001

ISSUED DATE : 2020.09.22

COMMODITY : E.R.W STEEL PIPE

SPECIFICATION : API 5CT J55 CASING PSL1

주식회사 휴스틸
HUSTEEL Co., Ltd.

HEAD OFFICE SHINAN B/D 15F, 943-19, DAECHI-DONG, KANGNAM-GU, SEOUL, KOREA
DANGJIN PLANT 131, BUGOKGONGDAN STREET, SONGAK-EUP, DANGJIN-SI, CHUNGCHEONGNAM-DO, KOREA

CERTIFICATE No. : 200922-0256

MANUFACTURED No. : 20-09-010-0

SUPPLIER : HUSTEEL CO., LTD.

CUSTOMER :

Original certificate can be verified through QReal Application.

NO.	HEAT_NO	QUAN-TITY	TYPE	NOMINAL SIZE	ORDER SIZE			WEIGHT	TENSILE TEST						CHEMICAL COMPOSITION(%)															
					O.D	W.T	LENGTH		DIR.	TS	YS	EL	YR	WTS	DIV	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ti	B	CE IIW	CE Pcm
		PCS	*1		inch	inch	ft	lb/ft	TYPE *3	PSI *4		%	%	PSI	*5	-2			-3					-4				-5	-3	
					*2											*6														
01	SP71300	295	BPE	9-5/8	9.625	0.352	45	34.89	L	80,057	61,203	37	76		H	24	17	137	12	2										
									L	88,324	70,340	33	80		P	22	16	137	8	1										
															P	23	16	136	10	2										
02	SP71302	323	BPE	9-5/8	9.625	0.352	45	34.89	L	86,439	71,501	36	83		H	23	17	139	11	1										
									L	83,103	67,440	35	81		P	23	16	138	7	1										
															P	22	16	135	10	1										
03	SP71304	322	BPE	9-5/8	9.625	0.352	45	34.89	L	81,653	64,249	34	79		H	23	17	140	11	1										
									L	83,828	64,684	37	77		P	22	15	135	11	2										
									L						P	21	15	136	11	2										

NO.	HYDROSTATIC TEST			HEAT TREATMENT	ZINC COATING TEST		THREADS		HARDNESS TEST	IMPACT TEST (0) ℃			*13 N · D · T (UT)	FLATTENING OR BEND TEST	VISUAL& DIMENSION	METALLOGRAPHIC TEST	RESIDUAL MAGNETISM
	T.P	H.T	RESULT		WZC	CST	TPI	ETL					GOOD	GOOD	GOOD	GOOD	
	PSI	sec		℃	g/㎡	TIMES		mm	HV	DIV *7	Energy (Ind, J)	SIZE *8	FLANGE TEST	REVERSE FLATTENING TEST	CRUSH TEST	DRIFT TEST	
	*9			*10	*11		*12										
01	3200	5	GOOD	960												GOOD	
02	3200	5	GOOD	960													
03	3200	5	GOOD	960													

- Latest edition per API 5CT(10,2018)
- Tensile specimen size : 1.5 inch width

NOTE

*1.Type of Pipe Ends

BPE	Black Plain Ends	**GPE**	Galvanized Plain Ends
BPEB	BPE Bevelled	**GPEB**	GPE Bevelled
BTE	Black Threaded Ends	**GTE**	Galvanized Threaded Ends
BTC	BlackThreaded & Coupled	**GTC**	Galvanized Threaded & Coupled

* 2. **O.D** : Outside Diameter, **W.T** : Wall Thickness
* 3. Direction & Type **- L** : Longitudinal Strip, **T** : Transverse Strip, **F** : Full Size Longitudinal, Size - 38.1mm(O.D 170mm above), 25.4mm(O.D 60.3 ~ 170mm), 19.1mm(O.D 50mm and below), Full Size(O.D 27.2mm and below)
* 4. **Tensile Test -TS** : Tensile Strength, **YS** : Yield Strength, **YR** : Yield Ratio, **EL** : Elongation, **WTS** : Weld tensile strength, **Gauge Length** : 2 inch, **Y.P method** 0.5% Underload
* 5. **H** : Heat analysis, **P** : Product analysis * 6. **-2** : x1/100, **-3** : x1/1000, **-4** : x1/10000, **-5** : x1/100000, **Tr** :Trace * 7. **B** : Base Metal, **W** : Weld Line, **H** : Heat Affected Zone
* 8. **Specimen Size - A** :10x10mm, **B** :10x7.5mm, **C** :10x6.6mm, **D** :10x5.0mm, **E** :10x3.3mm, **Direction** : Longitudinal * 9. **T.P** : Testing Pressure, **H.T** : Holding Time * 10. **Heat Treatment** Seam Normalizing
* 11. **WZC** : Weight of Zinc Coating, **CST** : Copper Sulphate Test * 12. **TPI** : Threads per inch, **ETL** : Effective length of threads * 13. **NDT** : UT, **Reference Standard** 3.2¢ Drilled Hole

SURVEYOR

WE HEREBY CERTIFY THAT THE PRODUCT HAS BEEN MANUFACTURED, SAMPLED, TESTED OR INSPECTED, OR BOTH, IN ACCORDANCE WITH THIS STANDARD AND HAS BEEN FOUND TO MEET THE REQUIREMENTS.

S.G. Lee

MANAGER OF Q.A TEAM

INSPECTION CERTIFICATE

P/O No. : P10125
L/C No. : HU20110829001

ISSUED DATE : 2020.09.22

COMMODITY : E.R.W STEEL PIPE

SPECIFICATION : API 5CT J55 CASING PSL1

주식회사 휴스틸
HUSTEEL Co., Ltd.

HEAD OFFICE SHINAN B/D 15F, 943-19, DAECHI-DONG, KANGNAM-GU, SEOUL, KOREA
DANGJIN PLANT 131, BUGOKGONGDAN STREET, SONGAK-EUP, DANGJIN-SI, CHUNGCHEONGNAM-DO, KOREA

CERTIFICATE No. : 200922-0256

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SUPPLIER : HUSTEEL CO., LTD.

CUSTOMER :

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NO.	HEAT_NO	QUAN-TITY	TYPE	NOMINAL SIZE	ORDER SIZE			WEIGHT	TENSILE TEST						CHEMICAL COMPOSITION(%)															
					O.D	W.T	LENGTH		DIR.	TS	YS	EL	YR	WTS	DIV	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ti	B	CE IIW	CE Pcm
		PCS	*1		inch	inch	ft	lb/ft	TYPE *3	PSI *4		%	%	PSI	*5	-2			-3					-4				-5	-3	
					*2											*6														
04	SP71307	340	BPE	9-5/8	9.625	0.352	45	34.89	L	83,683	64,249	36	77		H	23	17	138	13	1										
									L	89,339	72,951	33	82		P	22	16	135	11	1										
															P	22	16	138	9	1										
05	SP71310	36	BPE	9-5/8	9.625	0.352	45	34.89	L	82,523	65,409	35	79		H	24	18	139	11	1										
															P	22	16	135	11	2										
															P	22	16	137	12	1										

NO.	HYDROSTATIC TEST			HEAT TREATMENT	ZINC COATING TEST		THREADS		HARDNESS TEST	IMPACT TEST (0) ℃			*13 N · D · T (UT)	FLATTENING OR BEND TEST	VISUAL& DIMENSION	METALLOGRAPHIC TEST	RESIDUAL MAGNETISM
	T.P	H.T	RESULT		WZC	CST	TPI	ETL		DIV	Energy (Ind, J)	SIZE	GOOD	GOOD	GOOD	GOOD	
	PSI	sec		℃	g/㎡	TIMES		mm	HV	*7		*8	FLANGE TEST	REVERSE FLATTENING TEST	CRUSH TEST	DRIFT TEST	
	*9			*10	*11		*12										
04	3200	5	GOOD	960												GOOD	
05	3200	5	GOOD	960													

- Latest edition per API 5CT(10,2018)
- Tensile specimen size : 1.5 inch width

NOTE

*1.Type of Pipe Ends

BPE	Black Plain Ends	**GPE**	Galvanized Plain Ends
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S.G. Lee

MANAGER OF Q.A TEAM

Attachment 6
Surface Casing Cementing Report & Pipe Tally

HALLIBURTON

WILDCATTER CONSULTING LLC-EBUS

Newton County Landfill IW-1 9132534

County: Newton
State: Indiana
United States of America

SO#: 0908046760
VIDA ID: H078556
Rig: Work Over

Post Job Summary
13.625” SURFACE CASING

Date: 9/20/2022

Submitted by:
Derek Anderson
Sr. Technical Professional
Halliburton Energy Services

HALLIBURTON

HALLIBURTON

1.0 Job Information

1.1 Casing, Wellbore, and Tool Data

Description	Size **in**	Weight **lbm/ft**	ID **in**	Thread	Grade	Top MD **ft**	Btm MD **ft**	Top TVD **ft**	Btm TVD **ft**	Shoe Jnt **ft**	% Excess
20" Conductor Casing	**20**	**94**	**19.124**			**0**	**105**				
17-1/2" Open Hole			**17.5**			**105**	**1536**				**75**
13-3/8" Surface Casing	**13.375**	**54.5**	**12.615**			**0**	**1535**			**41**	

1.2 Fluids Pumped

Fluid #	Fluid Type	Fluid Name	Rqstd Del Qty	UOM	Density **lbm/gal**	Yield **ft3/ sack**	Water Req **Gal/sack**	Rate **bbl/min**
1	**Spacer/Flush**	**Gel**	**40**	**bbl**	**8.33**			**5**
2	**Spacer/Flush**	**Water**	**10**	**bbl**	**8.4**			**5**
3	**Cement**	**VariCem**	**855**	**sk**	**13.1**	**1.84**	**10.01**	**7**
4	**Cement**	**HalCem**	**500**	**sk**	**15.6**	**1.2**	**5.27**	**5.5**
	Top Plug/Start Displacement							
5	**Displacement**	**Water**	**231**	**bbl**	**8.33**			**5-7**

HALLIBURTON

2.0 Real-Time Job Summary

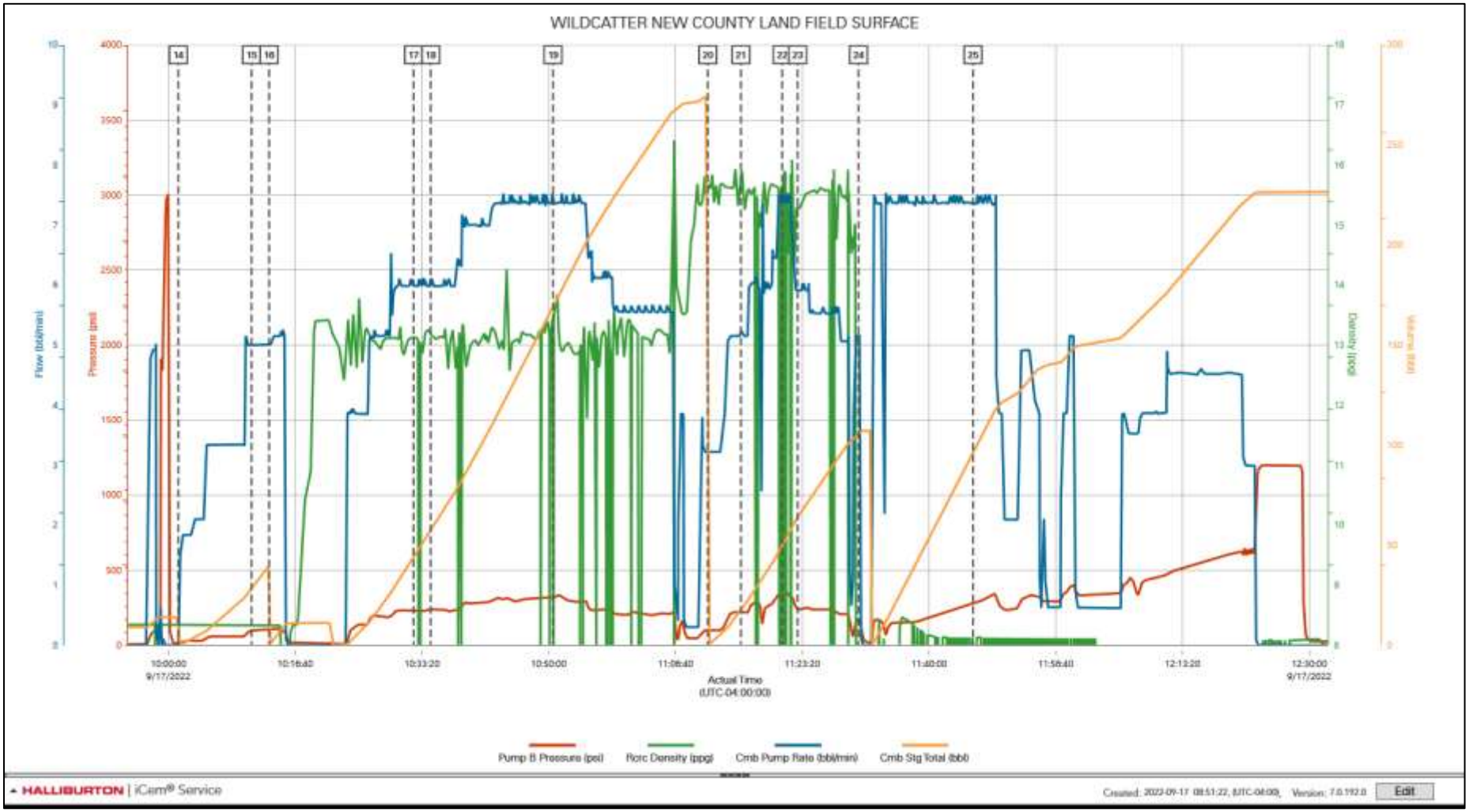
2.1 Job Event Log

Seq. No.	Activity	Date	Time	Comments
1	Call Out	9/16/2022	19:30:25	WILDCATTER NEW COUNTY LAND FIELD #9132534 - 13 3/8" Surface Casing - On location 09/17/22 @ 05:00
2	Safety Meeting - Departing Location	9/16/2022	20:55:50	Review Journey Management And Route With Crew Members
3	Depart from Service Center or Other Site	9/16/2022	22:00:27	Depart From Yard
4	Arrive At Loc	9/17/2022	05:00:28	Talk To Company Man () : TD = 1,536', TP = 1,535', ST = 41', OH = 17 1/2" CSG = 13 3/8" 54.5#, WF = WBM @ 9.1#, Test Water = pH – 7, Chlorides - < 290 ppm, 67 F
5	Safety Meeting - Assessment of Location	9/17/2022	05:10:29	Spot Equipment
6	Safety Meeting - Pre Rig-Up	9/17/2022	05:20:35	Review JSA With Crew Members
7	Rig-Up Equipment	9/17/2022	06:00:36	Rig Up Iron And Hoses Needed For Job
8	Rig-Up Completed	9/17/2022	07:30:38	Rigged Up All Iron And Hoses Needed For CMT Job With No Issues Or Incidents.
9	Safety Meeting - Pre Job	9/17/2022	08:30:41	Review Job Procedure And JSA With Rig Hands, Co. Man, And HES Members
10	Rig-Up Equipment	9/17/2022	08:45:37	Rig Up Plug Container And Rig Floor To Run CMT Job.
11	Start Job	9/17/2022	08:50:53	Start Job
12	Test Lines	9/17/2022	08:55:10	Performed A Kick Out Test To 500 psi On Both Pumps Then Tested Lines To 3,000 psi, good Test.
13	Pump Spacer	9/17/2022	09:20:38	Pumped Spacer 40 bbls Of Gel Spacer 5 BPM With 108 psi, Good Returns.
14	Pump Spacer 2	9/17/2022	10:01:18	Pumped 10 bbls Of Fresh Water 5 BPM With 122 psi, Good Returns.
15	Pump Lead Cement	9/17/2022	10:10:56	Pumped 280.5 bbls Of Lead Cement 855 Sacks With A Yield Of 1.842 And A Water Requirement Of 10.01 Gals/Sack. 7 BPM With 280 psi, Good Returns

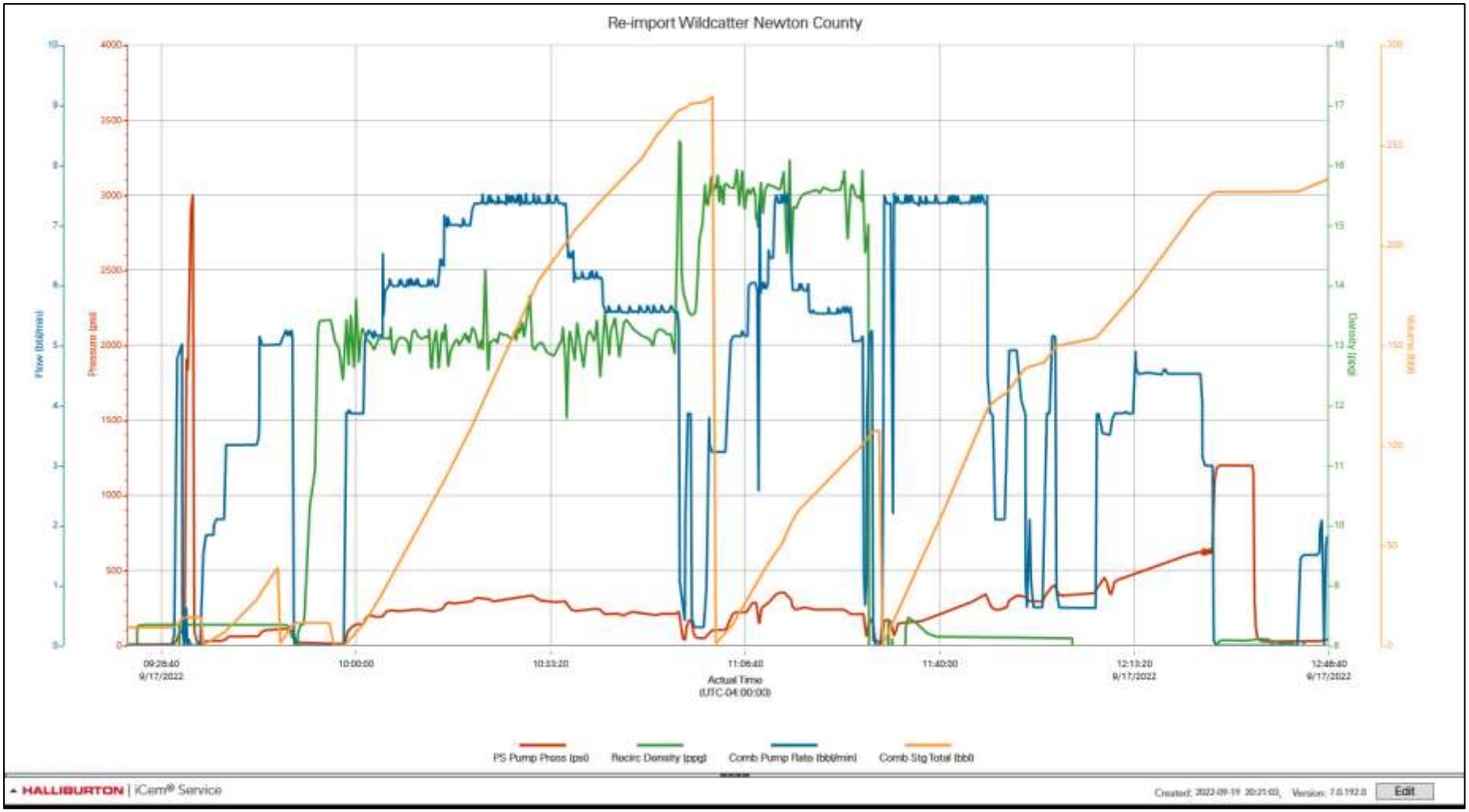
16	Pump Tail Cement	9/17/2022	10:13:14	Pumped 106.6 bbls Of Cement 500 Sacks With A Yield Of 1.197 And A Water Requirement Of 5.26 Gals/Sack. 5.5 BPM With 240 psi, Good Returns.
17	Drop Top Plug	9/17/2022	10:32:14	Drop Top Plug
18	Pump Displacement	9/17/2022	10:34:29	Pump Displacement 231 bbls Fresh Water 7 BPM With 155 psi, Good Returns.
19	Pump Displacement	9/17/2022	10:50:34	100 bbls Gone Into Displacement 7 BPM With 320psi Good Returns.
20	Pump Displacement	9/17/2022	11:10:55	200 bbls Gone Into Displacement 5 BPM With 480psi Good Returns. We Got A Total Of 40 bbls Of Spacer And 150 bbls Of Cement Back To Surface.
21	Bump Plug	9/17/2022	11:15:16	Bumped Plug With Calculated Displacement And Put 500 psi Over Final Circulating Pressure. Pressure Climbed From 600 psi To 1,200 psi.
22	Bleed Casing	9/17/2022	11:20:42	Bled Pressure Back To Zero And Got 1.5 bbls Back
23	Check Floats	9/17/2022	11:22:43	Floats Held Good.
24	Safety Meeting - Pre Rig-Down	9/17/2022	11:30:44	Review JSA With HES Crew Members
25	Rig-Down Equipment	9/17/2022	11:45:47	Rig Down Iron, Plug Container, And Hoses Used On Job
26	Rig-Down Completed	9/17/2022	12:45:48	All Equipment Rigged Down With On Incidents
27	Safety Meeting - Service Center or other Site	9/17/2022	12:55:26	Review Journey Management And Route With Crew Members
28	Depart Location	9/17/2022	13:00:52	Depart location

3.0 Job Graphs

3.1 Entire Job



3.2 Reimport Data – Entire Job



HALLIBURTON

North East, Zanesville

Lab Results- Primary

Job Information

Request/Slurry	2759581/6	**Rig Name**		**Date**	24/AUG/2022
Submitted By	Derek Anderson	**Job Type**	Surface Casing	**Bulk Plant**	Zanesville, OH
Customer		**Location**		**Well**	Newton County Landfill IW-1

Well Information

Casing/Liner Size	13.625 in	**Depth MD**	1510 ft	**BHST**	34°C / 93°F
Hole Size	17.5 in	**Depth TVD**	1510 ft	**BHCT**	24°C / 75°F
Pressure	1800 psi				

Cement Information - Primary Design

Conc	UOM	Cement/Additive
		VariCem
10.01	gal/sack	Fresh Water

Cement Properties

Slurry Density	13.1	lbm/gal
Slurry Yield	1.84	ft3/sack
Water Requirement	10.01	gal/sack
Total Mix Fluid	10.01	gal/sack
Water Source	Fresh Water	
Water Chloride		

Operation Test Results Request ID 2759581/6

Mixability (0 - 5) - 0 is not mixable

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

API Rheology

Temp (degF)	300	200	100	60	30	6	3	Foam Quality (%)
75 (up)	71	60	48	41	38	30	24	0
75 (down)	71	58	45	40	36	33	34	0
75 (avg.)	71	59	47	41	37	32	29	0

PV (cP) & YP (lbs/100ft2): 40.65 33.39 (Least-squares method)

PV (cP) & YP (lbs/100ft2): 36.75 34.25 (Traditional method (300 & 100 rpm based))

Generalized Herschel-Bulkley 4: YP(lbf/100ft2)=30.28 MuInf(cP)=23.71 m=0.69 n=0.69

Thickening Time

Temp (degF)	Pressure (psi)	Reached in (min)	Start BC	30 Bc (hh:mm)	40 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)	100 Bc (hh:mm)
75	1800	35	13.9	4:13	4:36	5:05	6:11	7:15

API Fluid Loss

Test Temp (degF)	Test Pressure (psi)	Test Time (min)	Meas. Vol.	Calculated FL (<30 min)	Conditioning time (min)	Conditioning Temp (degF)	Heat up Time
72	1000	12.17	76	238.64	65	75	35

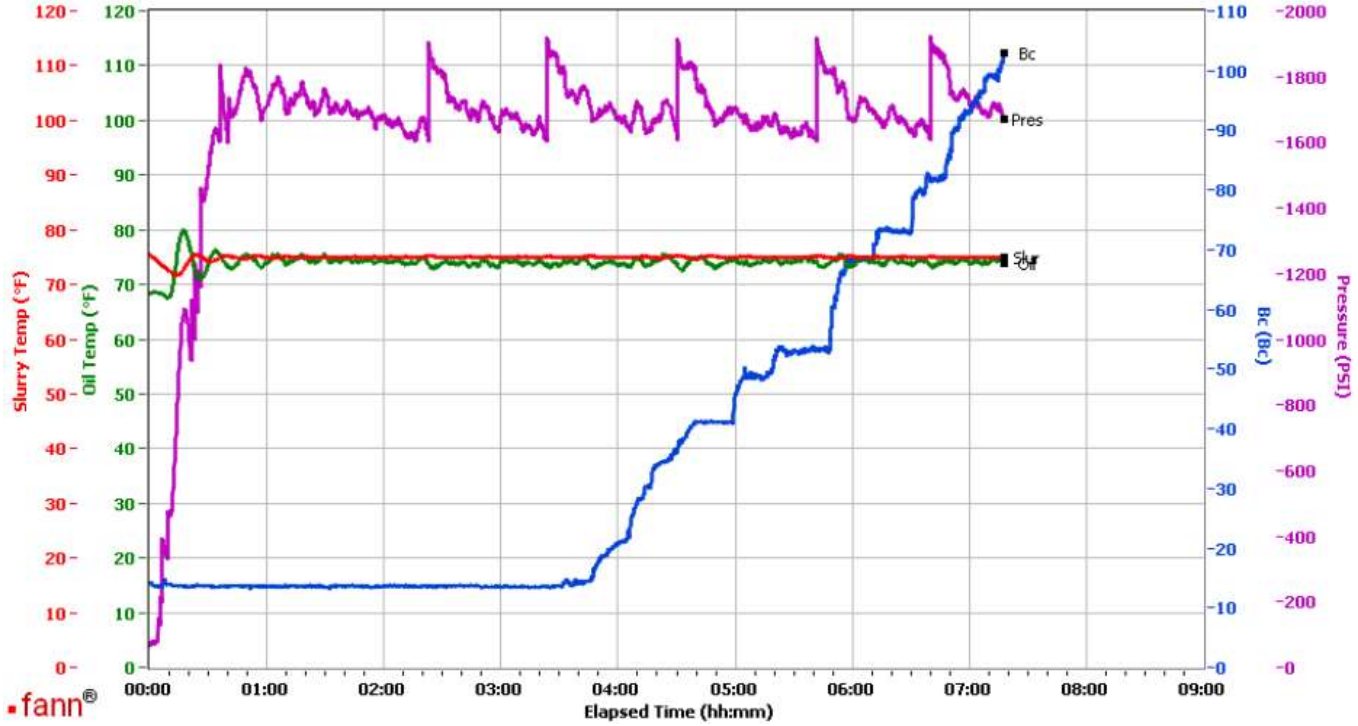
Free Fluid API 10B-2

Con. Temp (degF)	Heat Time (min)	Cond. Time (min)	Static T. (F)	Static time (min)	Incl. (deg)	% Fluid
75	35	65	72	60	0	0

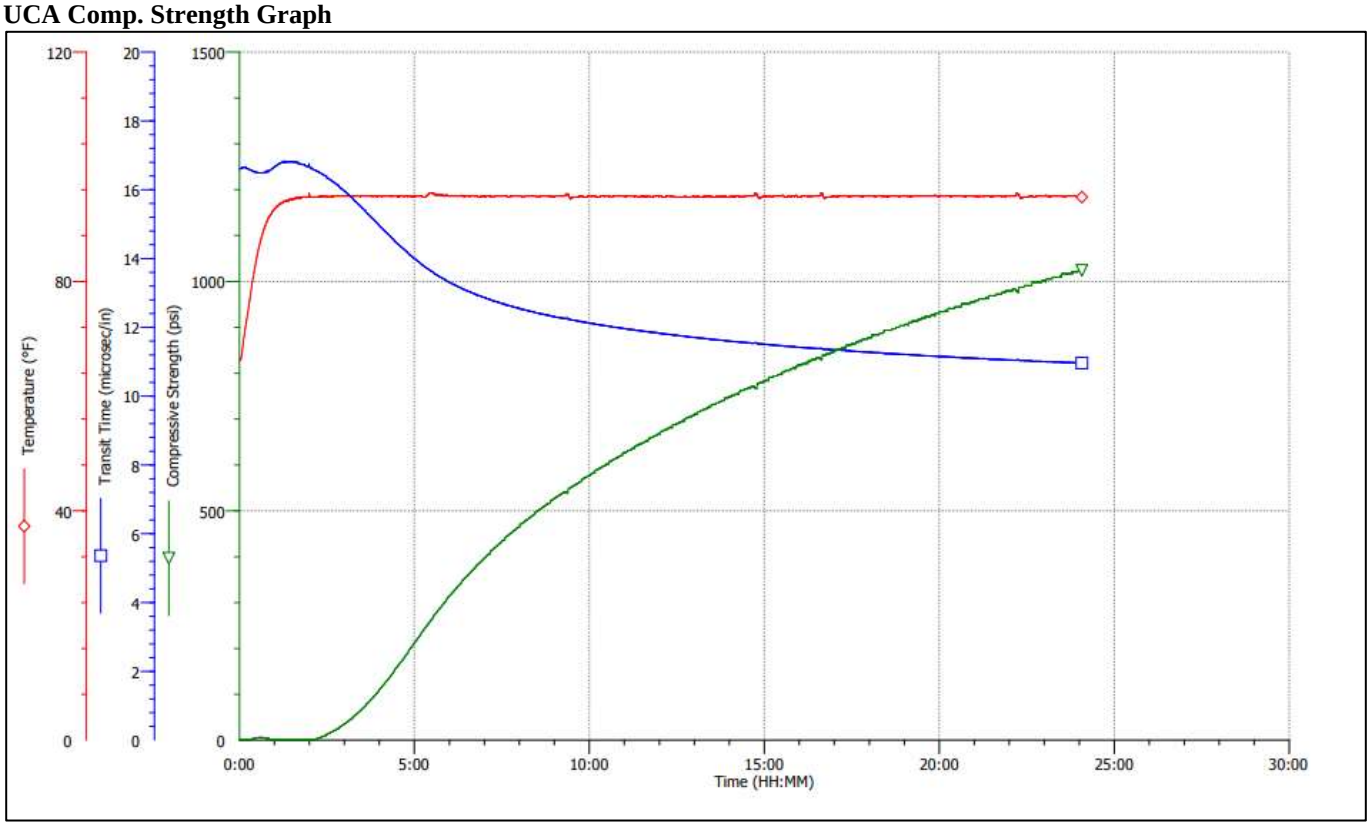
UCA Comp. Strength

End Temp (degF)	Pressure (psi)	50 psi (hh:mm)	100 psi (hh:mm)	500 psi (hh:mm)	1000 psi(hh:mm)	8hr CS (psi)	12 hr CS (psi)	16 hr CS (psi)	24 hr CS (psi)	End CS (psi)	End Time (hrs)
93	3000	3:15	3:54	8:32	22:56	464	667	817	1024	1024	24.04

Thickening Time Graph



UCA Comp. Strength Graph



HALLIBURTON

North East, Zanesville

Lab Results- Tail

Job Information

Request/Slurry	2760266/1	**Rig Name**		**Date**	AUG/28/2022
Submitted By	Derek Anderson	**Job Type**	Surface Casing	**Bulk Plant**	Zanesville, OH
Customer	Halliburton	**Location**		**Well**	Newton County Landfill IW-1

Well Information

Casing/Liner Size	13.375 in	**Depth MD**	1510 ft	**BHST**	34°C / 93°F
Hole Size	17.25 in	**Depth TVD**	1510 ft	**BHCT**	24°C / 75°F
Pressure	1800 psi				

Drilling Fluid Information

Mud Supplier Name	**Mud Trade Name**	**Density**	9 lbm/gal

Cement Information - Primary Design

Conc	UOM	Cement/Additive
		HalCem
5.27	gal/sack	Fresh Water

Cement Properties

Slurry Density	15.6	lbm/gal
Slurry Yield	1.2	ft3/sack
Water Requirement	5.27	gal/sack
Water Source	Fresh Water	
Water Chloride		

Operation Test Results Request ID 2760266/1

Mixability (0 - 5) - 0 is not mixable, Request Test ID:39197405

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

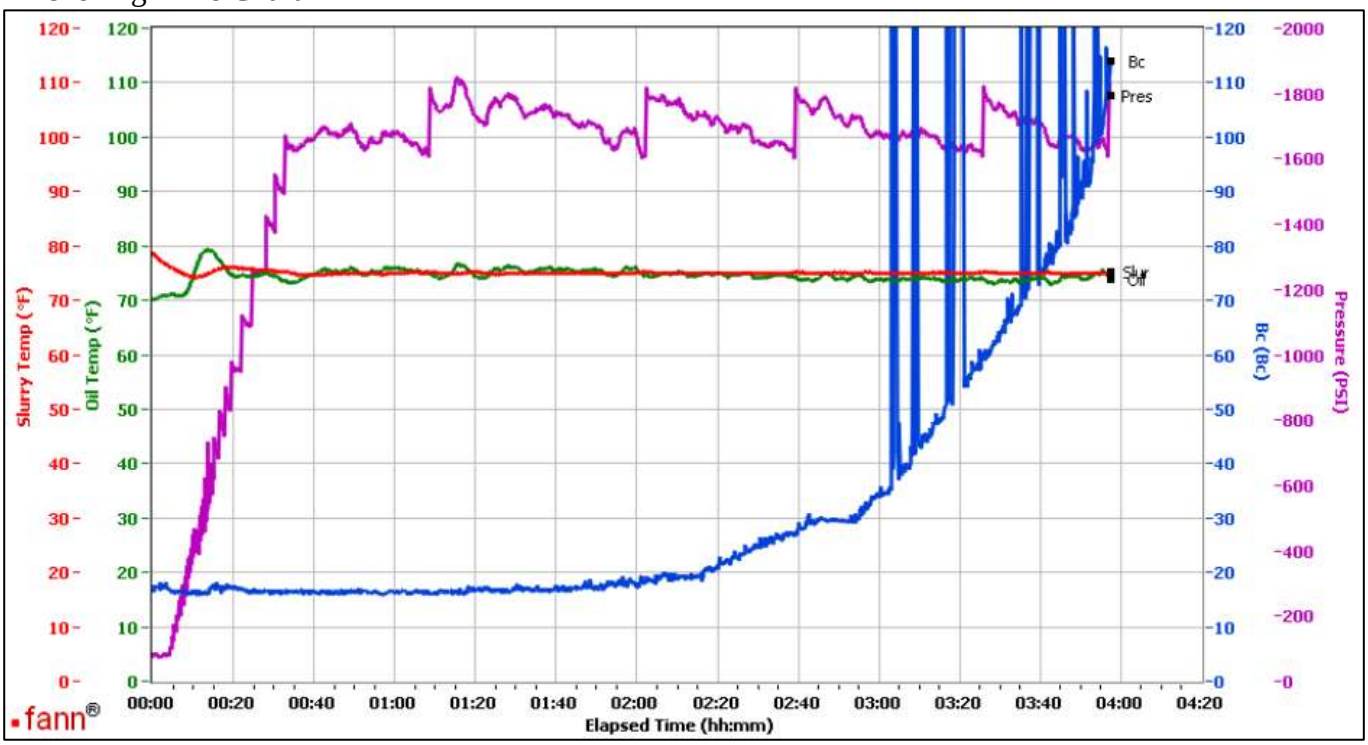
Thickening Time, Request Test ID:39197406

Temp (degF)	Pressure (psi)	Reached in (min)	Start BC	30 Bc (hh:mm)	40 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)	100 Bc (hh:mm)
75	1800	35	16.9	2:42	3:07	3:16	3:35	3:54

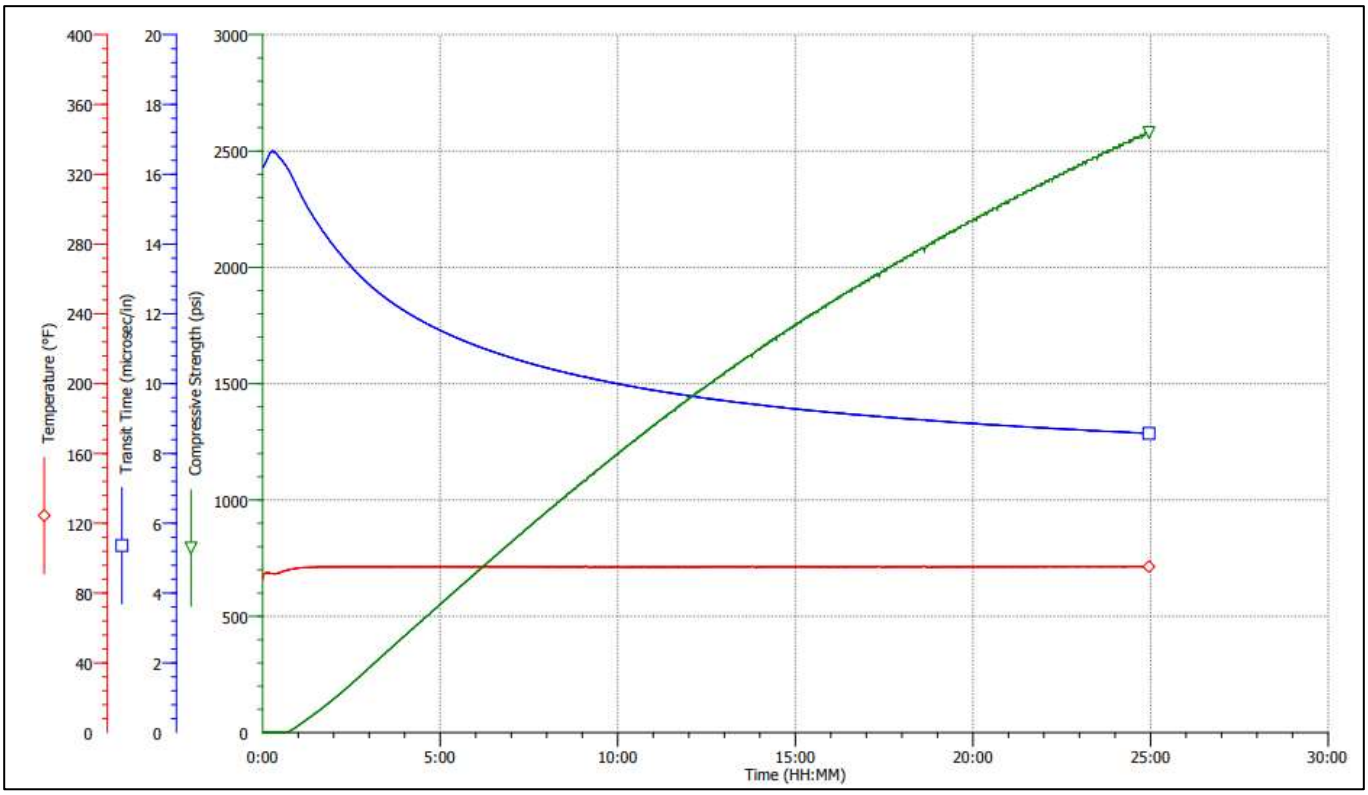
UCA Comp. Strength, Request Test ID:39197407

End Temp (degF)	Pressure (psi)	50 psi (hh:mm)	100 psi (hh:mm)	500 psi (hh:mm)	1000 psi(hh:mm)	8hr CS (psi)	12 hr CS (psi)	16 hr CS (psi)	24 hr CS (psi)	End CS (psi)	End Time (hrs)
93	3000	1:11	1:38	4:38	8:24	949	1436	1848	2514	2579	25

Thickening Time Chart



UCA Chart



Cement

Well Name: Newton IW-2

Surface Casing Cement

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-2	Sec 12 - T29N - R8W		EPA IN-111-1I-0002	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
704.00		17.00		9/7/2022 16:00	10/15/2022 19:00

Surface Casing Cement, Casing, 9/17/2022 06:03

Type	Cementing Start Date	Cementing End Date	Wellbore	String
Casing	9/17/2022	9/17/2022	Original Hole	Surface, 1,535.0ftKB
Cementing Company	**Evaluation Method**	**Cement Evaluation Results**		
Halliburton Energy Services	Cement Bond Log			

Comment: Job went good and had 150 bbls cmt to surface

1, 0.0-1,535.0ftKB

Top Depth (ftKB)	Bottom Depth (ftKB)	Full Return?	Vol Cement Ret (bbl)	Top Plug?	Bottom Plug?
0.0	1,535.0	Yes	150.0	No	Yes
Initial Pump Rate (bbl/min)	**Final Pump Rate (bbl/min)**	**Avg Pump Rate (bbl/min)**		**Final Pump Pressure (psi)**	**Plug Bump Pressure (psi)**
7	7	7		600.0	1,200.0
Pipe Reciprocated?	**Reciprocation Stroke Length (ft)**	**Reciprocation Rate (spm)**		**Pipe Rotated?**	**Pipe RPM (rpm)**
Yes				No	
Tagged Depth (ftKB)	**Tag Method**	**Depth Plug Drilled Out To (ftKB)**		**Drill Out Diameter (in)**	**Drill Out Date**
				12 1/4	9/19/2022

Spacer

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Spacer				
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**

Cement Stage Fluid Additives

Add	Type	Conc

Spacer

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Spacer				
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**

Cement Stage Fluid Additives

Add	Type	Conc

Lead

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Lead		855	A Varicem	280.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
		75.0	1.84	10.01
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**
	13.10			

Cement Stage Fluid Additives

Add	Type	Conc
Varicem	trade secret	

Tail

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Tail		500	A Halcem	106.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
		50.0	1.84	5.27
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**
	15.60			

Cement Stage Fluid Additives

Add	Type	Conc
Halcem	Trade Secret	

Displacement

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Displacement				231.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**

Cement Stage Fluid Additives

Add	Type	Conc

Casing Tally

Well Name: Newton IW-2 **Surface, Set Depth: 1,535.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-2	Sec 12 - T29N - R8W		EPA IN-111-1I-0002	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
704.00		17.00		9/7/2022 16:00	10/15/2022 19:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
1		Casing Joints	13 3/8	54.50	J-55	Yes	41.50	No		Buttress Thread x Buttress Thread	1,493.5	41.50
2		Casing Joints	13 3/8	54.50	J-55	Yes	41.54	Yes		Buttress Thread	1,452.0	83.04
3		Casing Joints	13 3/8	54.50	J-55	Yes	41.50	No		Buttress Thread	1,410.5	124.54
4		Casing Joints	13 3/8	54.50	J-55	Yes	41.51	Yes		Buttress Thread	1,369.0	166.05
5		Casing Joints	13 3/8	54.50	J-55	Yes	41.57	No		Buttress Thread	1,327.4	207.62
6		Casing Joints	13 3/8	54.50	J-55	Yes	41.60	Yes		Buttress Thread	1,285.8	249.22
7		Casing Joints	13 3/8	54.50	J-55	Yes	41.62	No		Buttress Thread	1,244.2	290.84
8		Casing Joints	13 3/8	54.50	J-55	Yes	41.57	Yes		Buttress Thread	1,202.6	332.41
9		Casing Joints	13 3/8	54.50	J-55	Yes	41.50	No		Buttress Thread	1,161.1	373.91
10		Casing Joints	13 3/8	54.50	J-55	Yes	41.08	Yes		Buttress Thread	1,120.0	414.99
11		Casing Joints	13 3/8	54.50	J-55	Yes	41.54	No		Buttress Thread	1,078.5	456.53
12		Casing Joints	13 3/8	54.50	J-55	Yes	41.53	Yes		Buttress Thread	1,036.9	498.06
13		Casing Joints	13 3/8	54.50	J-55	Yes	41.57	No		Buttress Thread	995.4	539.63
14		Casing Joints	13 3/8	54.50	J-55	Yes	41.57	Yes		Buttress Thread	953.8	581.20
15		Casing Joints	13 3/8	54.50	J-55	Yes	41.62	No		Buttress Thread	912.2	622.82
16		Casing Joints	13 3/8	54.50	J-55	Yes	41.56	Yes		Buttress Thread	870.6	664.38
17		Casing Joints	13 3/8	54.50	J-55	Yes	41.54	No		Buttress Thread	829.1	705.92
18		Casing Joints	13 3/8	54.50	J-55	Yes	41.27	Yes		Buttress Thread	787.8	747.19
19		Casing Joints	13 3/8	54.50	J-55	Yes	41.55	No		Buttress Thread	746.3	788.74
20		Casing Joints	13 3/8	54.50	J-55	Yes	41.50	Yes		Buttress Thread	704.8	830.24
21		Casing Joints	13 3/8	54.50	J-55	Yes	41.48	No		Buttress Thread	663.3	871.72
22		Casing Joints	13 3/8	54.50	J-55	Yes	41.58	Yes		Buttress Thread	621.7	913.30
23		Casing Joints	13 3/8	54.50	J-55	Yes	41.54	No		Buttress Thread	580.2	954.84
24		Casing Joints	13 3/8	54.50	J-55	Yes	41.60	Yes		Buttress Thread	538.6	996.44
25		Casing Joints	13 3/8	54.50	J-55	Yes	41.55	No		Buttress Thread	497.0	1,037.99
26		Casing Joints	13 3/8	54.50	J-55	Yes	41.47	Yes		Buttress Thread	455.5	1,079.46
27		Casing Joints	13 3/8	54.50	J-55	Yes	35.74	No		Buttress Thread	419.8	1,115.20
28		Casing Joints	13 3/8	54.50	J-55	Yes	41.47	Yes		Buttress Thread	378.3	1,156.67
29		Casing Joints	13 3/8	54.50	J-55	Yes	41.45	No		Buttress Thread	336.9	1,198.12
30		Casing Joints	13 3/8	54.50	J-55	Yes	41.58	Yes		Buttress Thread	295.3	1,239.70

Casing Tally

Well Name: Newton IW-2 **Surface, Set Depth: 1,535.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-2	Sec 12 - T29N - R8W		EPA IN-111-1I-0002	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
704.00		17.00		9/7/2022 16:00	10/15/2022 19:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
31		Casing Joints	13 3/8	54.50	J-55	Yes	41.55	No		Buttress Thread	253.8	1,281.25
32		Casing Joints	13 3/8	54.50	J-55	Yes	41.60	Yes		Buttress Thread	212.2	1,322.85
33		Casing Joints	13 3/8	54.50	J-55	Yes	41.58	No		Buttress Thread	170.6	1,364.43
34		Casing Joints	13 3/8	54.50	J-55	Yes	41.45	Yes		Buttress Thread	129.1	1,405.88
35		Casing Joints	13 3/8	54.50	J-55	Yes	41.48	No		Buttress Thread	87.6	1,447.36
36		Casing Joints	13 3/8	54.50	J-55	Yes	41.50	Yes		Buttress Thread	46.1	1,488.86
37		Float Collar	13 3/8			Yes	1.25	No		Buttress Thread	44.9	1,490.11
38		Casing Joints	13 3/8	54.50	J-55	Yes	41.54	Yes		Buttress Thread	3.3	1,531.65
39		Float Shoe				Yes	1.77	No		Buttress Thread	1.6	1,533.42

Attachment 7
Intermediate Casing Cementing Report & Pipe Tally

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WILDCATTER CONSULTING LLC-EBUS

Newton County Landfill IW-1 9132534

County: Newton
State: Indiana

United States of America

SO#: 0908135314
VIDA ID: H081502
Rig: Work Over

Post Job Summary
9.625” PRODUCTION CASING

Date: 10/4/2022

Submitted by:
Antonio Tezen
Sr. Technical Professional
Halliburton Energy Services

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1.0 Job Information

1.1 Casing, Wellbore, and Tool Data

Description	Size in	Weight lbm/ft	ID in	Thread	Grade	Top MD ft	Btm MD ft	Shoe Jnt ft	% Excess
13-3/8" Surface Casing	13.375	54.5	12.615			0	1533		
12-1/4" Open Hole			12.25			1533	3277		30
9-5/8" Production Casing	9.625	36	8.921			0	3277	84	

1.2 Fluids Pumped

Fluid #	Fluid Name	Package name SBM	Requested Quantity	UOM	Density lbm/gal	Yield ft3/sack	Water Req gal/sack	Rate bbl/min
1	Drilling Fluid (Mud)		0.0	bbl	9.2			0.0
2	Spacer/Flush	Tuned prime Spacer	35.0	bbl	10.0	9.8	65.95	6.0
3	Cement	VariCem	471.00	sk	13.1	1.84	9.99	6.0
4	Cement	HalCem	613.00	sk	15.6	1.18	5.2	6.0
	Top Plug/Start Displacement							0.0
5	Mud	Water	247.8	bbl	9.0			6.0

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2.0 Real-Time Job Summary

2.1 Job Event Log

Seq. No.	Activity	Date/Time	Comments
1	Call Out	29-Sep-2022 13:00	WILDCATTER NEW COUNTY LAND FIELD #9132534 - 9 5/8" Production Casing - On location 09/30/22 @ 02:00
2	Safety Meeting - Service Center or other Site	29-Sep-2022 16:45	Review Journey Management And Route With Crew Members
3	Depart from Service Center or Other Site	29-Sep-2022 17:00	Depart From Yard
4	Arrive At Loc	30-Sep-2022 01:30	Talk To Company Man () : TD = 3 280' TP = 3 284.7' ST = 86.53' OH = 12 1/4" CSG = 9 5/8" 36# WF = WBM @ 9# Test Water = pH – 7 Chlorides - < 290 ppm 58 F
5	Safety Meeting - Assessment of Location	30-Sep-2022 01:40	Spot Equipment
6	Safety Meeting - Pre Rig-Up	30-Sep-2022 01:50	Review JSA With Crew Members
7	Rig-Up Equipment	30-Sep-2022 02:00	Rig Up Iron And Hoses Needed For Job
8	Rig-Up Completed	30-Sep-2022 03:00	Rigged Up All Iron And Hoses Needed For CMT Job With No Issues Or Incidents.
9	Safety Meeting - Pre Job	30-Sep-2022 09:15	Review Job Procedure And JSA With Rig Hands Co. Man And HES Members
10	Rig-Up Equipment	30-Sep-2022 09:30	Rig Up Plug Container And Rig Floor To Pump Truck To Run Cement Job. Water Test: Temp 58F, pH 7, Chlorides 290
11	Start Job	30-Sep-2022 09:52	Start Job.
12	Test Lines	30-Sep-2022 09:55	Performed A Kick Out Test To 500 psi On Both Pumps Then Tested Lines To 5 000 psi good Test.
13	Pump Spacer 2	30-Sep-2022 10:07	Pumped Tuned Spacer 35 bbls @ 10 PPG @ 5 BPM With 180 psi Good Returns.
14	Pump Lead Cement	30-Sep-2022 10:17	Pumped 154 bbls Of Lead Cement 471 Sacks 13.1 PPG With A Yield Of 1.863 And A Water Requirement Of 9.99 Gals/Sack. & temp 65F. 5.5 BPM With 286 psi Good Returns. HOC=2 384' TOC=0'.
15	Pump Tail Cement	30-Sep-2022 10:46	Pumped 129 bbls Of Cement 613 Sacks 15.6 PPG With A Yield Of 1.181 And A Water Requirement Of 5.2 Gals/Sack. & temp of 65F. 7 BPM With 360 psi Good Returns. HOC=2131' TOC=1 149'.

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16	Drop Top Plug	30-Sep-2022 11:11	Drop Top Plug
17	Pump Displacement	30-Sep-2022 11:12	Pump Displacement 247 bbls Of 9# Brine Water
18	Pump Displacement	30-Sep-2022 11:27	100 bbls Into Displacement 7 BPM With 440 psi Good Returns
19	Pump Displacement	30-Sep-2022 11:42	200 bbls Into Displacement 5 BPM With 1 100 psi Good Returns
20	Other	30-Sep-2022 11:50	We Got A Total Of 35 bbls Of Tuned Spacer And 79 bbls Of Lead Cement Back To Surface.
21	Other	30-Sep-2022 11:59	Pumped Capacity Of Casing But Did Not Bump Plug As Per Co. Man Pumped Half The Capacity Of Shoe Track o f Was 3.3 bbls But Still Did Not Bump Plug. Held Pressure For Five Minuets. Bled Back Pressure To Zero And Got 1 bbl Back Floats Held Good. Will Leave Cement Head Rigged Up For 8 Hours.
22	End Job	30-Sep-2022 12:10	End Job.
23	Safety Meeting - Pre Rig-Down	30-Sep-2022 12:20	Review JSA With HES Crew Members
24	Rig-Down Equipment	30-Sep-2022 12:30	Rig Down Iron Plug Container And Hoses Used On Job
25	Rig-Down Completed	30-Sep-2022 13:00	All Equipment Rigged Down With On Incidents
26	Safety Meeting - Departing Location	30-Sep-2022 13:20	Review Journey Management And Route With Crew Members
27	Depart Location	30-Sep-2022 13:30	Depart location

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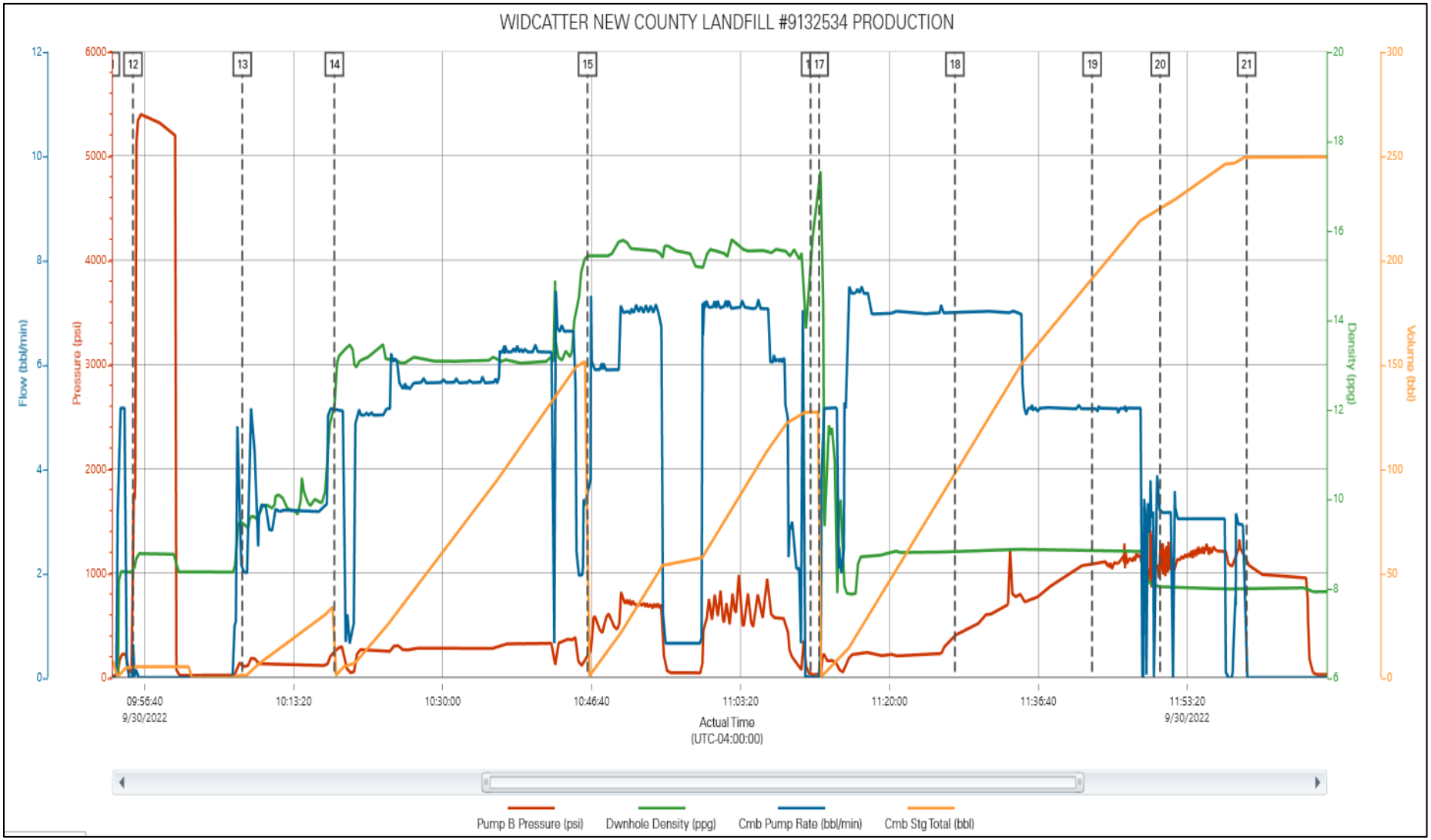
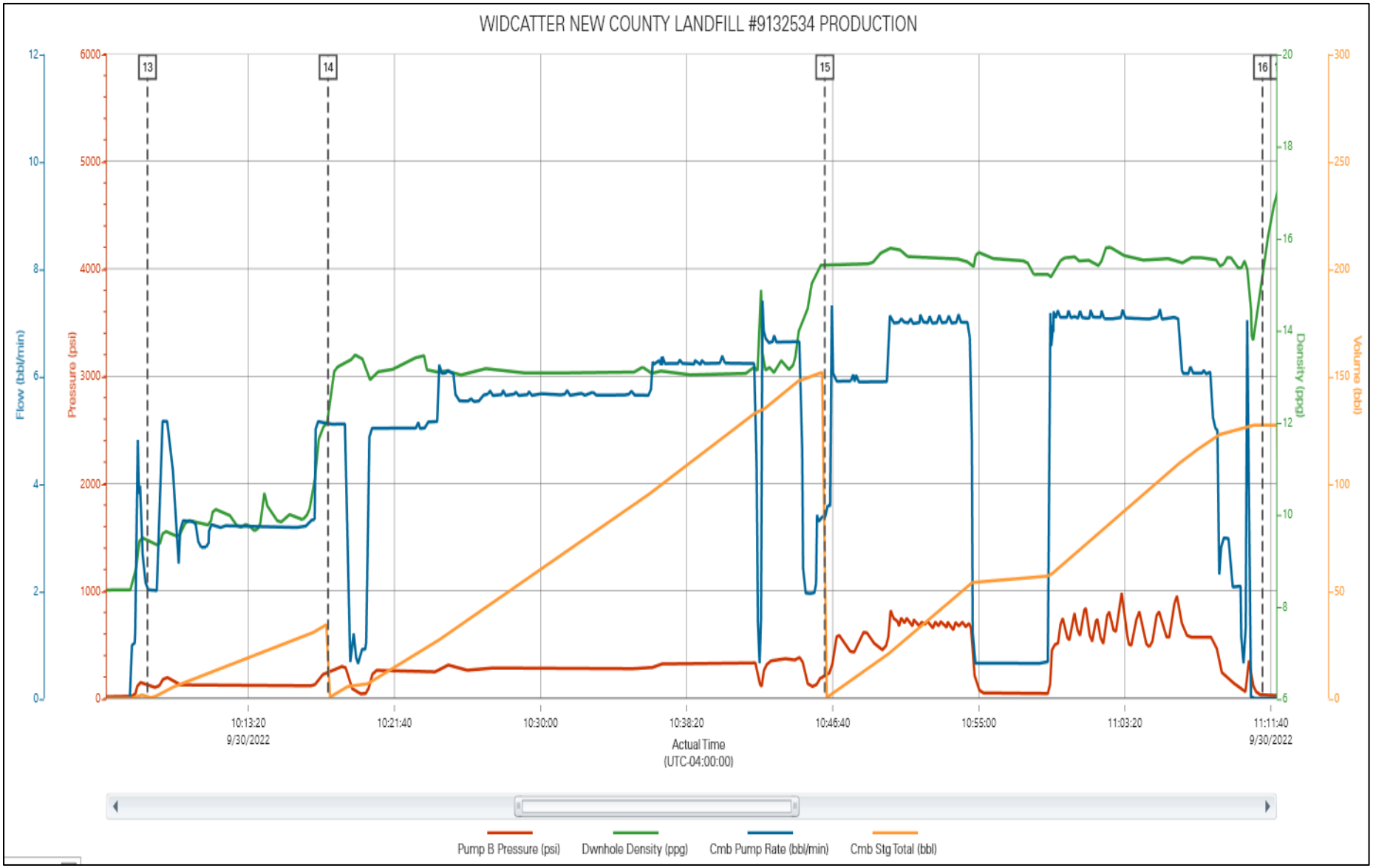
3.0 Job Graphs

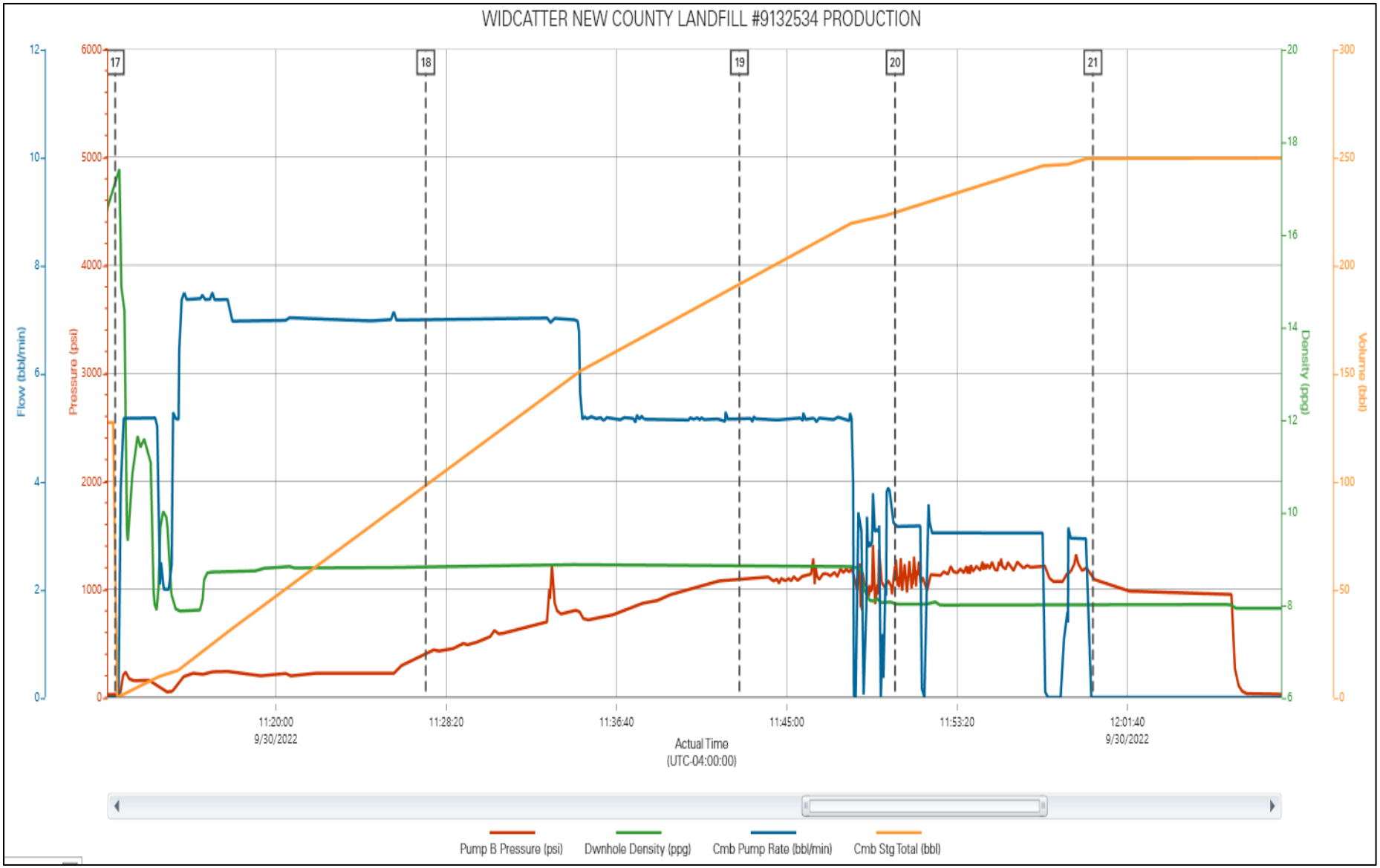
3.1 Entire Job



3.2 Weighted Fluids



3.3 Displacement



HALLIBURTON

North East, Zanesville

Lab Results- Spacer

Job Information

Request/Slurry	2764135/1	**Rig Name**		**Date**	SEP/26/2022
Submitted By	Derek Anderson	**Job Type**	Production Casing	**Bulk Plant**	Zanesville, OH
Customer	Halliburton	**Location**		**Well**	Newton County Landfill IW-1

Well Information

Casing/Liner Size	9.625 in	**Depth MD**	3130 ft	**BHST**	61°C / 141°F
Hole Size	12.25 in	**Depth TVD**	3130 ft	**BHCT**	42°C / 108°F
Pressure	3000 psi				

Spacer Information - Spacer Design

Conc	UOM	Cement/Additive
		Tuned Prime Spacer
37.79	gal/bbl	Fresh Water

Spacer Properties

Slurry Density	10	lbm/gal
Slurry Yield	9.8	ft3/sack
Water Requirement	65.95	gal/sack
Water Source	Fresh Water	

Pilot Test Results Request ID 2764135/1

Mixability (0 - 5) - 0 is not mixable, Request Test ID:39251656 — SEP/28/2022

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

API Rheology, Request Test ID:39260435 — SEP/28/2022

Temp (degF)	300	200	100	60	30	6	3	Foam Quality (%)
80 (up)	24	21	17	16	14	11	10	0
80 (down)	24	21	16	14	13	10	9	0
80 (avg.)	24	21	17	15	14	11	10	0

API Rheology, Request Test ID:39260436 — SEP/28/2022

Temp (degF)	300	200	100	60	30	6	3	Cond Time (min)	Cond Temp (degF)	Foam Quality (%)
108 (up)	23	21	20	17	15	12	11	40	108	0
108 (down)	23	21	19	17	14	11	10	40	108	0
108 (avg.)	23	21	20	17	15	12	11	40	108	0

Mud Balance Density WBM, Request Test ID:39260437 — SEP/28/2022

Density (ppg)
9.2

API Rheology WBM, Request Test ID:39260438 — SEP/28/2022

Temp (degF)	300	200	100	60	30	6	3	Cond Time (min)	Cond Temp (degF)	Foam Quality (%)
108 (up)	50	40	26	18	12	5	3	40	108	0
108 (down)	50	37	24	17	11	4	2	40	108	0
108 (avg.)	50	39	25	18	12	5	3	40	108	0

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North East, Zanesville

Lab Results- Lead

Job Information

Request/Slurry	2764710/1	**Rig Name**		**Date**	SEP/26/2022
Submitted By	Marco Tezen - H188615	**Job Type**	Production Casing	**Bulk Plant**	Zanesville, OH
Customer	Halliburton	**Location**		**Well**	Newton County Landfill IW-1

Well Information

Casing/Liner Size	9.625 in	**Depth MD**	3306 ft	**BHST**	63°C / 145°F
Hole Size	12.25 in	**Depth TVD**	3306 ft	**BHCT**	44°C / 111°F
Pressure	3000 psi				

Cement Information - Lead Design

Conc	UOM	Cement/Additive
		VariCem Blend
9.99	gal/sack	Fresh Water

Cement Properties		
Slurry Density	13.1	lbm/gal
Slurry Yield	1.84	ft3/sack
Water Requirement	9.99	gal/sack
Water Source	Fresh Water	
Water Chloride		

Mixability (0 - 5) - 0 is not mixable, Request Test ID:39260381 — SEP/28/2022

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

Thickening Time - ON-OFF-ON, Request Test ID:39260386 — SEP/28/2022

Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:min)	50 Bc (hh:min)	70 Bc (hh:min)	100 Bc (hh:min)	Start Bc	Stirring before stop (mins)	Static Period (min)
111	3000	40	2:01	8:08	2:46	3:12	10.6	60	30

UCA Comp. Strength, Request Test ID:39260387 — SEP/29/2022

End Temp (degF)	Pressure (psi)	50 psi (hh:mm)	100 psi (hh:mm)	500 psi (hh:mm)	1000 psi(hh:mm)	8hr CS (psi)	12 hr CS (psi)	16 hr CS (psi)	24 hr CS (psi)
105	3000	2:59	3:29	7:26	21:03	538	745	883	1058

API Rheology, Request Test ID:39248786, — SEP/21/2022

Temp (degF)	300	200	100	60	30	6	3	Foam Quality (%)
80 (up)	70	58	44	37	32	22	16	0
80 (down)	70	52	36	29	24	16	16	0
80 (avg.)	70	55	40	33	28	19	16	0

API Rheology, Request Test ID:39248787, — SEP/21/2022

Temp (degF)	300	200	100	60	30	6	3	Cond Time (min)	Cond Temp (degF)	Foam Quality (%)
108 (up)	60	42	26	19	13	7	5	70	108	0
108 (down)	60	46	28	19	13	7	5	70	108	0
108 (avg.)	60	44	27	19	13	7	5	70	108	0

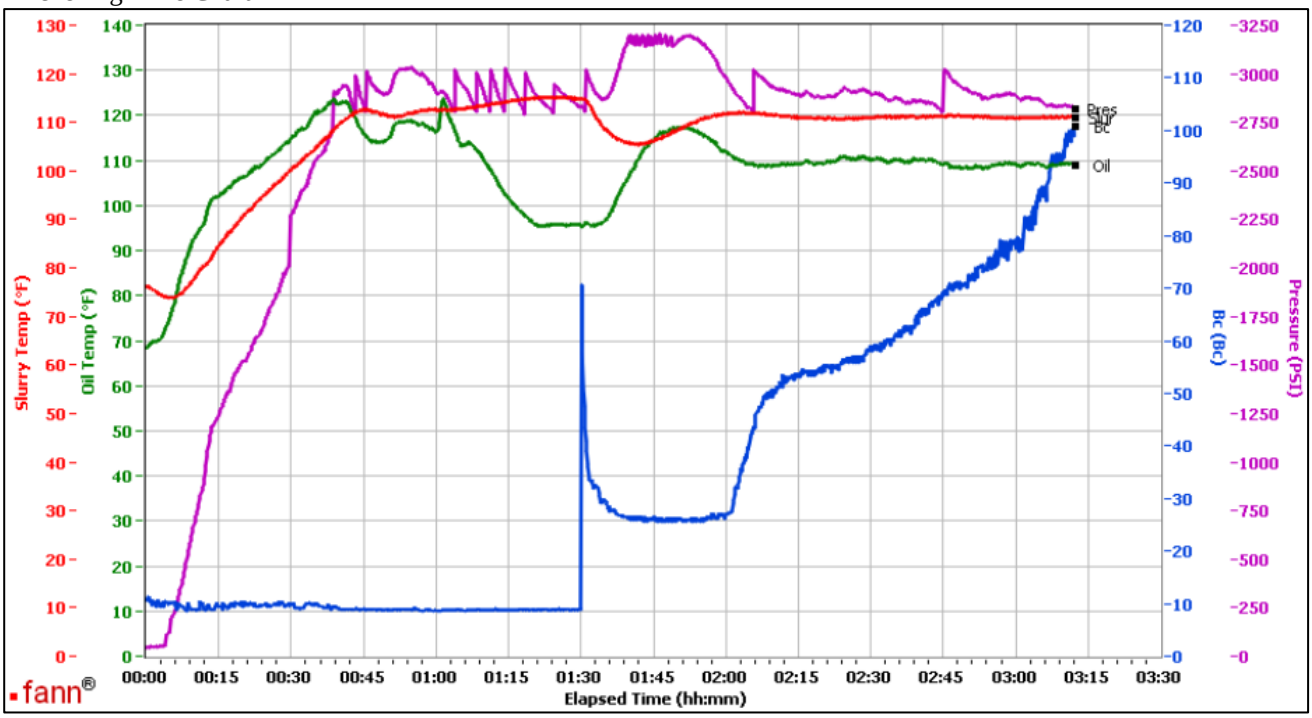
API Fluid Loss, Request Test ID:39248788, — SEP/21/2022

Test Temp (degF)	Test Pressure (psi)	Test Time (min)	Meas. Vol.	Calculated FL (<30 min)	Conditioning time (min)	Conditioning Temp (degF)	Heat up Time
108	1000	8.5	71	266.76	70	108	40

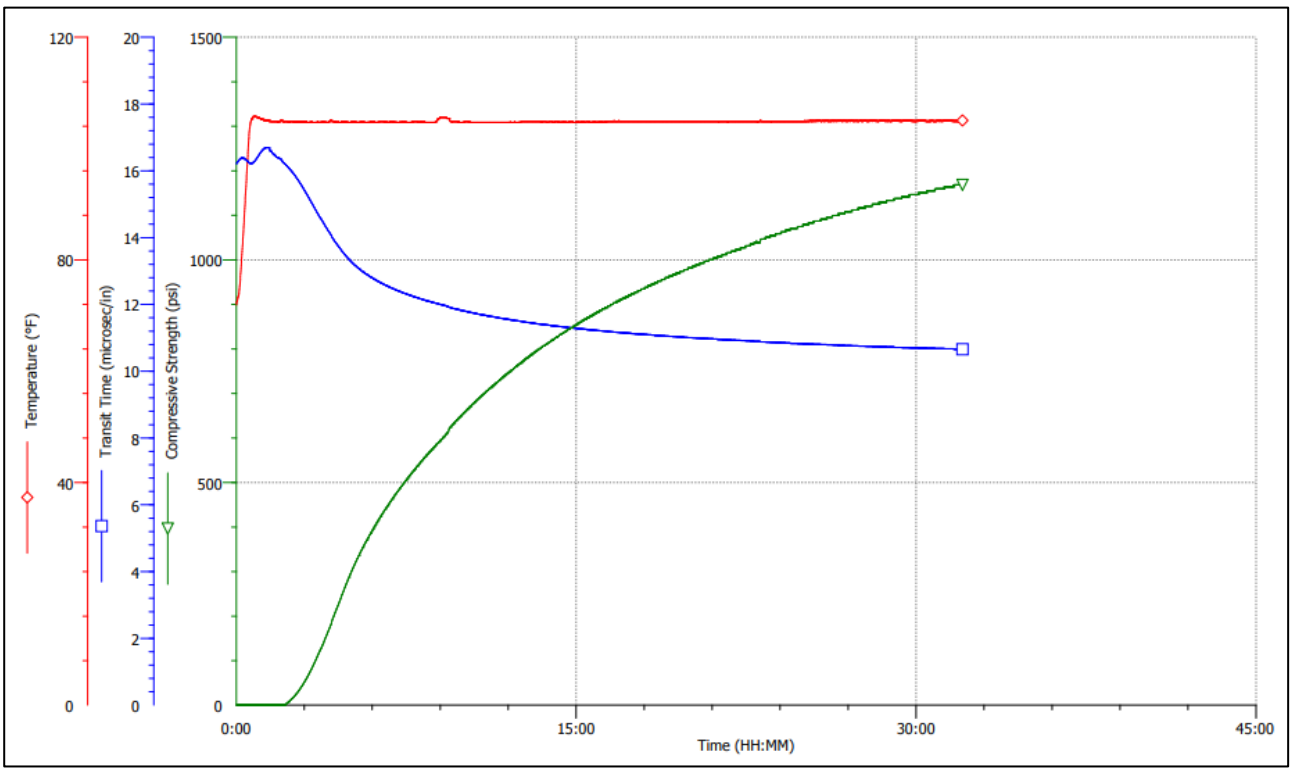
Free Fluid API 10B-2, Request Test ID:39248789, — SEP/21/2022

Con. Temp (degF)	Heat Time (min)	Cond. Time (min)	Static T. (F)	Static time (min)	Incl. (deg)	% Fluid
108	40	70	72	120	45	0

Thickening Time Chart



UCA Chart



HALLIBURTON

North East, Zanesville

Lab Results- Tail

Job Information

Request/Slurry	2764709/1	**Rig Name**		**Date**	SEP/26/2022
Submitted By	Marco Tezen - H188615	**Job Type**	Production Casing	**Bulk Plant**	Zanesville, OH
Customer	Halliburton	**Location**		**Well**	Newton County Landfill IW-1

Well Information

Casing/Liner Size	9.625 in	**Depth MD**	3306 ft	**BHST**	63°C / 145°F
Hole Size	12.25 in	**Depth TVD**	3306 ft	**BHCT**	44°C / 111°F
Pressure	3000 psi				

Cement Information - Tail Design

Conc	UOM	Cement/Additive
		HalCem Blend
5.2	gal/sack	Fresh Water
0.15	% BWOC	Retarder

Cement Properties

Slurry Density	15.6	lbm/gal
Slurry Yield	1.18	ft3/sack
Water Requirement	5.2	gal/sack
Water Source	Fresh Water	

Mixability (0 - 5) - 0 is not mixable, Request Test ID:39260374 — SEP/27/2022

Mixability rating (0 - 5)	Avg rpm mixing under load (~12,000)	Blend addition time (sec) @ 4,000 RPM
5	12000	15

UCA Comp. Strength, Request Test ID:39260380 — SEP/29/2022

End Temp (degF)	Pressure (psi)	50 psi (hh:mm)	100 psi (hh:mm)	500 psi (hh:mm)	1000 psi(hh:mm)	8hr CS (psi)	12 hr CS (psi)	16 hr CS (psi)	24 hr CS (psi)	End CS (psi)	End Time (hrs)
145	3000	1:35	1:42	2:19	3:15	2046	2399	2590	2836	3068	36.21

Thickening Time - ON-OFF-ON, Request Test ID:39260379 — SEP/27/2022

Test Temp (degF)	Pressure (psi)	Reached in (min)	30 Bc (hh:min)	50 Bc (hh:min)	70 Bc (hh:min)	100 Bc (hh:min)	Start Bc	Stirring before stop (mins)	Static Period (min)
111	3000	40	0:01	2:08	2:19	2:27	29.1	40	30

API Rheology, Request Test ID:39247114, Historical Data — SEP/21/2022

Temp (degF)	300	200	100	60	30	6	3	Foam Quality (%)
80 (up)	71	50	31	23	16	8	7	0
80 (down)	71	53	34	26	19	11	10	0
80 (avg.)	71	52	33	25	18	10	9	0

API Rheology, Request Test ID:39247115, Historical Data — SEP/21/2022

Temp (degF)	300	200	100	60	30	6	3	Cond Time (min)	Cond Temp (degF)	Foam Quality (%)
108 (up)	98	80	57	48	39	28	25	70	108	0
108 (down)	98	79	56	47	38	27	25	70	108	0
108 (avg.)	98	80	57	48	39	28	25	70	108	0

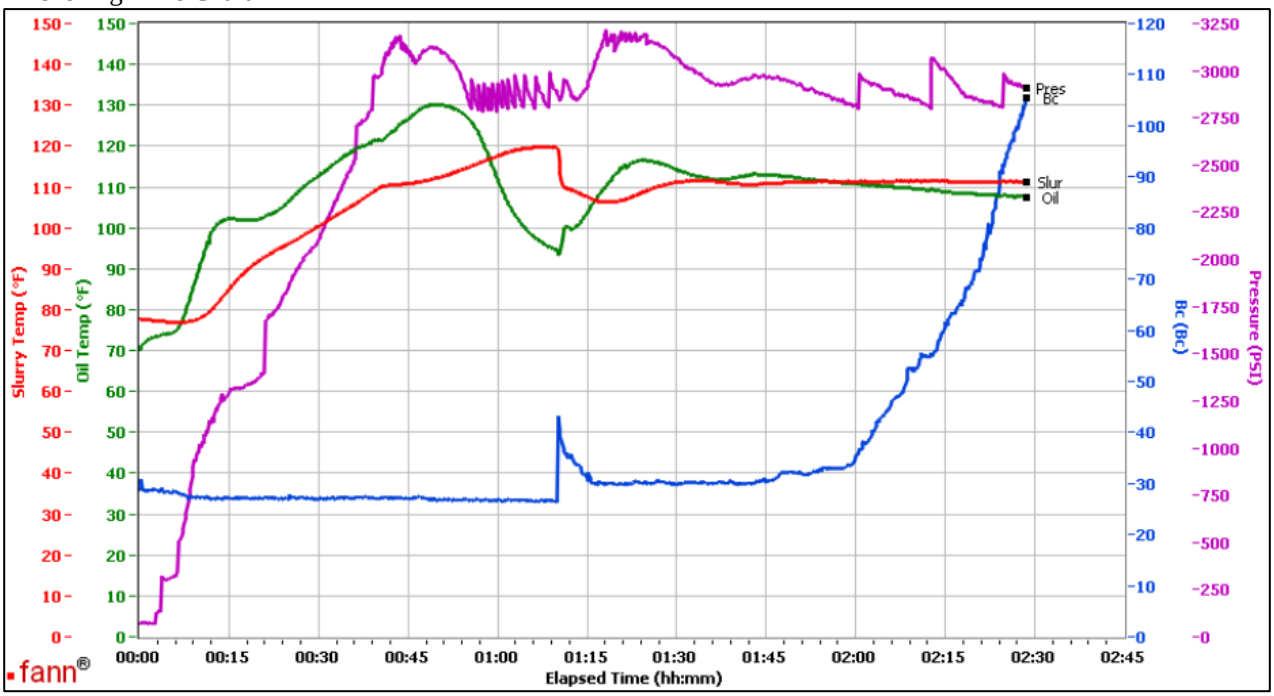
API Fluid Loss, Request Test ID:39247116, Historical Data — SEP/21/2022

Test Temp (degF)	Test Pressure (psi)	Test Time (min)	Meas. Vol.	Calculated FL (<30 min)	Conditioning time (min)	Conditioning Temp (degF)	Heat up Time
108	1000	4.5	54	278.84	70	108	40

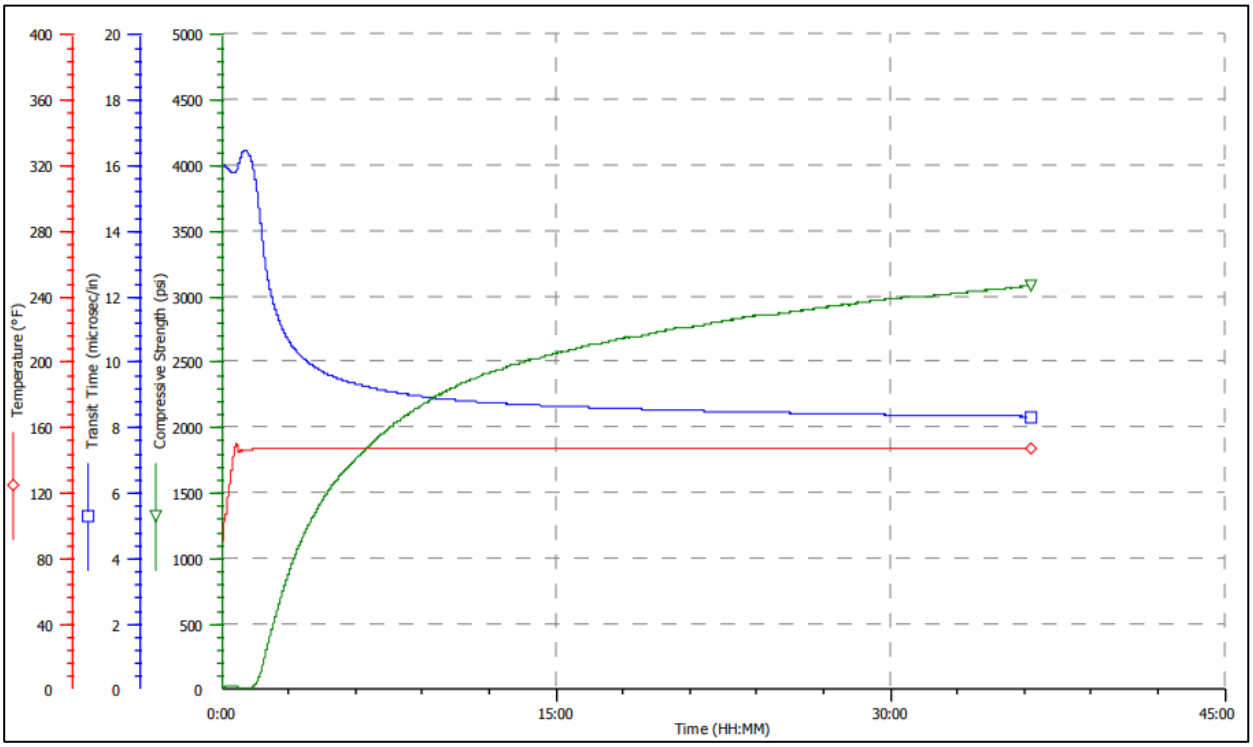
Free Fluid API 10B-2, Request Test ID:39247117, Historical Data — SEP/21/2022

Con. Temp (degF)	Heat Time (min)	Cond. Time (min)	Static T. (F)	Static time (min)	Incl. (deg)	% Fluid
108	40	70	72	120	0	0

Thickening Time Chart



UCA Chart



Cement

Well Name: Newton IW-2

Production Casing Cement

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-2	Sec 12 - T29N - R8W		EPA IN-111-1I-0002	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
704.00		17.00		9/7/2022 16:00	10/15/2022 19:00

Production Casing Cement, Casing, 9/29/2022 22:17

Type	Cementing Start Date	Cementing End Date	Wellbore	String
Casing	9/29/2022	9/30/2022	Original Hole	Long String, 3,277.0ftKB
Cementing Company	**Evaluation Method**	**Cement Evaluation Results**		
Halliburton Energy Services	Cement Bond Log			

Comment: Job went good and had 79 bbls to surface

1, 0.0-1,149.0ftKB

Top Depth (ftKB)	Bottom Depth (ftKB)	Full Return?	Vol Cement Ret (bbl)	Top Plug?	Bottom Plug?
0.0	1,149.0	Yes	154.0	No	No
Initial Pump Rate (bbl/min)	**Final Pump Rate (bbl/min)**	**Avg Pump Rate (bbl/min)**		**Final Pump Pressure (psi)**	**Plug Bump Pressure (psi)**
6	6	6		286.0	
Pipe Reciprocated?	**Reciprocation Stroke Length (ft)**	**Reciprocation Rate (spm)**		**Pipe Rotated?**	**Pipe RPM (rpm)**
Yes				No	
Tagged Depth (ftKB)	**Tag Method**	**Depth Plug Drilled Out To (ftKB)**		**Drill Out Diameter (in)**	**Drill Out Date**

Lead

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Lead	13.1	471	A	154.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
0.0	1,149.0	30.0	1.84	
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**
	13.10			

Cement Stage Fluid Additives

Add	Type	Conc
Varicem	Trade Secret	

Tail

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Tail	15.6	613	A	129.0
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
1,149.0	3,277.0	30.0	1.18	
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**
	15.60			

Cement Stage Fluid Additives

Add	Type	Conc
Halcem	Trade Secret	

2, 1,149.0-3,277.0ftKB

Top Depth (ftKB)	Bottom Depth (ftKB)	Full Return?	Vol Cement Ret (bbl)	Top Plug?	Bottom Plug?
1,149.0	3,277.0	Yes	129.0	Yes	No
Initial Pump Rate (bbl/min)	**Final Pump Rate (bbl/min)**	**Avg Pump Rate (bbl/min)**		**Final Pump Pressure (psi)**	**Plug Bump Pressure (psi)**
7	7	7		360.0	
Pipe Reciprocated?	**Reciprocation Stroke Length (ft)**	**Reciprocation Rate (spm)**		**Pipe Rotated?**	**Pipe RPM (rpm)**
Yes				No	
Tagged Depth (ftKB)	**Tag Method**	**Depth Plug Drilled Out To (ftKB)**		**Drill Out Diameter (in)**	**Drill Out Date**

<typ>

Fluid Type	Fluid Description	Amount (sacks)	Class	Volume Pumped (bbl)
Estimated Top (ftKB)	**Estimated Bottom Depth (ftKB)**	**Percent Excess Pumped (%)**	**Yield (ft³/sack)**	**Mix H20 Ratio (gal/sack)**
Free Water (%)	**Density (lb/gal)**	**Plastic Viscosity (cP)**	**Thickening Time (hr)**	**1st Compressive Strength (psi)**

Cement Stage Fluid Additives

Add	Type	Conc

Casing Tally

Well Name: Newton IW-2 **Long String, Set Depth: 3,277.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-2	Sec 12 - T29N - R8W		EPA IN-111-1I-0002	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
704.00		17.00		9/7/2022 16:00	10/15/2022 19:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
1		Casing Joints	9 5/8	36.00	J-55	Yes	1.48	No		LT&C	3,275.5	1.48
2		Casing Joints	9 5/8	36.00	J-55	Yes	43.26	Yes		LT&C	3,232.3	44.74
3		Casing Joints	9 5/8	36.00	J-55	Yes	41.77	Yes		LT&C	3,190.5	86.51
4		Float Collar	9 5/8	36.00	J-55	Yes	1.67	No		LT&C	3,188.8	88.18
5		Casing Joints	9 5/8	36.00	J-55	Yes	41.70	Yes		LT&C	3,147.1	129.88
6		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	3,105.4	171.61
7		Casing Joints	9 5/8	36.00	J-55	Yes	41.78	No		LT&C	3,063.6	213.39
8		Casing Joints	9 5/8	36.00	J-55	Yes	41.78	Yes		LT&C	3,021.8	255.17
9		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	No		LT&C	2,980.1	296.91
10		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	2,938.4	338.64
11		Casing Joints	9 5/8	36.00	J-55	Yes	40.61	Yes		LT&C	2,897.8	379.25
12		Casing Joints	9 5/8	36.00	J-55	Yes	41.13	No		LT&C	2,856.6	420.38
13		Casing Joints	9 5/8	36.00	J-55	Yes	41.15	No		LT&C	2,815.5	461.53
14		Casing Joints	9 5/8	36.00	J-55	Yes	41.12	Yes		LT&C	2,774.4	502.65
15		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	No		LT&C	2,732.6	544.39
16		Casing Joints	9 5/8	36.00	J-55	Yes	41.16	No		LT&C	2,691.5	585.55
17		Casing Joints	9 5/8	36.00	J-55	Yes	40.50	Yes		LT&C	2,651.0	626.05
18		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	No		LT&C	2,609.2	667.79
19		Casing Joints	9 5/8	36.00	J-55	Yes	41.70	No		LT&C	2,567.5	709.49
20		Casing Joints	9 5/8	36.00	J-55	Yes	41.71	Yes		LT&C	2,525.8	751.20
21		Casing Joints	9 5/8	36.00	J-55	Yes	41.68	No		LT&C	2,484.1	792.88
22		Casing Joints	9 5/8	36.00	J-55	Yes	41.71	No		LT&C	2,442.4	834.59
23		Casing Joints	9 5/8	36.00	J-55	Yes	41.72	Yes		LT&C	2,400.7	876.31
24		Casing Joints	9 5/8	36.00	J-55	Yes	39.65	No		LT&C	2,361.0	915.96
25		Casing Joints	9 5/8	36.00	J-55	Yes	39.62	No		LT&C	2,321.4	955.58
26		Casing Joints	9 5/8	36.00	J-55	Yes	39.65	Yes		LT&C	2,281.8	995.23
27		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	2,240.0	1,036.96
28		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	2,198.3	1,078.69
29		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	Yes		LT&C	2,156.6	1,120.44
30		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	No		LT&C	2,114.8	1,162.19
31		Casing Joints	9 5/8	36.00	J-55	Yes	39.67	No		LT&C	2,075.1	1,201.86

Casing Tally

Well Name: Newton IW-2 **Long String, Set Depth: 3,277.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-2	Sec 12 - T29N - R8W		EPA IN-111-1I-0002	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
704.00		17.00		9/7/2022 16:00	10/15/2022 19:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
32		Casing Joints	9 5/8	36.00	J-55	Yes	39.67	Yes		LT&C	2,035.5	1,241.53
33		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	No		LT&C	1,993.7	1,283.28
34		Casing Joints	9 5/8	36.00	J-55	Yes	39.68	No		LT&C	1,954.0	1,322.96
35		Casing Joints	9 5/8	36.00	J-55	Yes	39.68	No		LT&C	1,914.4	1,362.64
36		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	Yes		LT&C	1,872.6	1,404.38
37		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	No		LT&C	1,830.9	1,446.13
38		Casing Joints	9 5/8	36.00	J-55	Yes	41.78	No		LT&C	1,789.1	1,487.91
39		Casing Joints	9 5/8	36.00	J-55	Yes	41.77	Yes		LT&C	1,747.3	1,529.68
40		Casing Joints	9 5/8	36.00	J-55	Yes	41.77	No		LT&C	1,705.6	1,571.45
41		Casing Joints	9 5/8	36.00	J-55	Yes	41.20	No		LT&C	1,664.4	1,612.65
42		Casing Joints	9 5/8	36.00	J-55	Yes	41.72	Yes		LT&C	1,622.6	1,654.37
43		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	No		LT&C	1,580.9	1,696.11
44		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	No		LT&C	1,539.2	1,737.85
45		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	Yes		LT&C	1,497.4	1,779.59
46		Casing Joints	9 5/8	36.00	J-55	Yes	41.78	No		LT&C	1,455.6	1,821.37
47		Casing Joints	9 5/8	36.00	J-55	Yes	41.72	No		LT&C	1,413.9	1,863.09
48		Casing Joints	9 5/8	36.00	J-55	Yes	41.64	Yes		LT&C	1,372.3	1,904.73
49		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	1,330.5	1,946.46
50		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	1,288.8	1,988.19
51		Casing Joints	9 5/8	36.00	J-55	Yes	41.70	Yes		LT&C	1,247.1	2,029.89
52		Casing Joints	9 5/8	36.00	J-55	Yes	41.72	No		LT&C	1,205.4	2,071.61
53		Casing Joints	9 5/8	36.00	J-55	Yes	41.15	No		LT&C	1,164.2	2,112.76
54		Casing Joints	9 5/8	36.00	J-55	Yes	44.82	Yes		LT&C	1,119.4	2,157.58
55		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	No		LT&C	1,077.7	2,199.32
56		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	No		LT&C	1,035.9	2,241.06
57		Casing Joints	9 5/8	36.00	J-55	Yes	44.86	Yes		LT&C	991.1	2,285.92
58		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	949.4	2,327.65
59		Casing Joints	9 5/8	36.00	J-55	Yes	41.18	No		LT&C	908.2	2,368.83
60		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	Yes		LT&C	866.4	2,410.56
61		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	No		LT&C	824.7	2,452.30

Casing Tally

Well Name: Newton IW-2 **Long String, Set Depth: 3,277.0ftKB**

API/UWI	Surface Legal Location	Field Name	License #	State/Province	Well Configuration Type
IW-2	Sec 12 - T29N - R8W		EPA IN-111-1I-0002	Indiana	Vertical
Ground Elevation (ft)	**Casing Flange Elevation (ft)**	**KB-Ground Distance (ft)**	**KB-Casing Flange Distance (ft)**	**Spud Date**	**Rig Release Date**
704.00		17.00		9/7/2022 16:00	10/15/2022 19:00

Casing Run Tally

Run #	Ref #	Item Des	OD (in)	Wt (lb/ft)	Grade	Run?	Len (ft)	Centralized?	Ext Jwlry	Connections	Top (ftKB)	Cum Len (ft)
62		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	No		LT&C	783.0	2,494.05
63		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	Yes		LT&C	741.2	2,535.79
64		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	699.5	2,577.52
65		Casing Joints	9 5/8	36.00	J-55	Yes	41.78	No		LT&C	657.7	2,619.30
66		Casing Joints	9 5/8	36.00	J-55	Yes	41.72	Yes		LT&C	616.0	2,661.02
67		Casing Joints	9 5/8	36.00	J-55	Yes	41.78	No		LT&C	574.2	2,702.80
68		Casing Joints	9 5/8	36.00	J-55	Yes	41.77	No		LT&C	532.4	2,744.57
69		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	Yes		LT&C	490.7	2,786.31
70		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	No		LT&C	448.9	2,828.06
71		Casing Joints	9 5/8	36.00	J-55	Yes	41.79	No		LT&C	407.2	2,869.85
72		Casing Joints	9 5/8	36.00	J-55	Yes	41.78	Yes		LT&C	365.4	2,911.63
73		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	No		LT&C	323.6	2,953.38
74		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	No		LT&C	281.9	2,995.13
75		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	Yes		LT&C	240.1	3,036.88
76		Casing Joints	9 5/8	36.00	J-55	Yes	41.73	No		LT&C	198.4	3,078.61
77		Casing Joints	9 5/8	36.00	J-55	Yes	41.75	No		LT&C	156.6	3,120.36
78		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	Yes		LT&C	114.9	3,162.10
79		Casing Joints	9 5/8	36.00	J-55	Yes	41.74	No		LT&C	73.2	3,203.84
		Casing Joints	9 5/8	36.00	J-55	No		No		LT&C		

Attachment 8
Agency Test Notification, Approval of MIT Procedures, & EPA RAT, Temp, & FOT Forms

Petrotek

10613 West Sam Houston Pkwy North, Ste 300, Houston, TX 77064
o: 832-399-4750 republicservices.com

April 5th, 2022
RE: Newton County Landfill Underground Injection Wells

Ms. Tera Fong
Division Director, Water Division
U.S. Environmental Protection Agency, EPA Region 5
Underground Injection Control
77 W. Jackson Blvd.
Chicago, IL 60604

Ms. Fong,

Per UIC Permit Numbers IN-111-1I-0001 and IN-111-1I-002, I am writing this letter to notify you of our intention to begin well construction for both Class 1 injection wells. This construction will not begin sooner than thirty days of the date of this letter.

Please let me know if you require additional information.

Sincerely,

Tom Rodriquez
Director of Operations, US Industrial Wells
Republic Industrial and Energy Services, LLC
TRodriquez@RepublicServices.com

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Tuesday, April 5, 2022 2:08 PM
To: fong.tera@epa.gov; Tong, William
Cc: McCuistion, Gary; Macaluso, Jim; Doug Torr; Rubin, Jason; Robinson, Tim; Frost, John; McGarry, Joshua; Smith, Steve
Subject: Newton County Landfill Injection Wells Drilling Notification
Attachments: Cover Letter Newton County Well 1 and 2 Drilling Notification - US EPA.pdf

Importance: High

Ms. Fong,

Please see the attached notification of our intent to construct the UIC Class 1 injection wells at Newton County Landfill in Brook, Indiana. This work will not commence sooner than thirty days from this notification.

Sincerely,

Tom Rodriquez
Director of Operations, US Industrial Wells
Republic Services Industrial and Energy Solutions, LLC.
M: 346-244-3671
E: trodriquez@republicservices.com

Odrowski, Brendan

From: Chase, Felicia <chase.felicia@epa.gov>
Sent: Monday, December 19, 2022 11:02 AM
To: Rodriquez, Tom
Cc: Tong, William
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification
Attachments: unwitnessed_sapt_form.pdf; unwitnesed_mit_compliance_assistance_05-31-17.pdf

Good Morning Tom,

Thank You for your notification. Please conduct your SAPT unwitnessed. You may invite the State Rep. to participate. Attached is a form and guidance for your use and reference.

Please forward to Bill Tong, your Permit Writer for your initial ATI.
Best,
Felicia Chase
Geologist/ Environmental Scientist
Permits Branch, UIC Section
U.S. EPA, Region 5
77 West Jackson Blvd., WP-16J
Chicago , IL 60604

From: Rodriquez, Tom <TRodriquez@republicservices.com>
Sent: Monday, December 19, 2022 9:56 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <chase.felicia@epa.gov>; Fong, Tera <Fong.Tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>; McCuistion, Gary <GMcCuistion@republicservices.com>; Brian Ault <bault@petrotek.com>
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Good morning,

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Please let me know if you have questions or comments.

Sincerely,

Tom Rodriquez

From: Rodriquez, Tom <TRodriquez@republicservices.com>
Sent: Wednesday, November 30, 2022 11:41 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
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If we have any changes, we will let you know. Timelines have been a little in flux due to the freezing conditions.

Please let me know if you have any questions or concerns.

Thanks,

Tom Rodriquez

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To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
Cc: Doug Torr <douglastorr56@gmail.com>; Rubin, Jason <JRubin@republicservices.com>; Greenhagen, Andrew <Greenhagen.Andrew@epa.gov>
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As a 30 day notification, Republic Services plans on finalizing the completion of the Newton County Injection Wells, #1 and #2 the second week of December. An exact date will be sent as soon as possible but not earlier than 30 days from today.

Our plan is to do an acid stimulation the last week of November, and do the MIT and fall off test in December.

Please let me know if you have any questions or issues.

Thanks,

Tom

Tom Rodriquez
Director, Deep Well Operations Support

10613 W Sam Houston Pkwy N, Suite 300
Houston, TX 77064
e TRodriquez@RepublicServices.com
o 832-399-4750
c 346-244-3671
w RepublicServices.com

Sustainability in Action

Odrowski, Brendan

From: Fong, Tera <Fong.Tera@epa.gov>
Sent: Monday, November 7, 2022 3:19 PM
To: Rodriquez, Tom
Subject: Automatic reply: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Thanks for your message. I will be out of the office on maternity leave from September 12 through early January 2023.

Scott Ireland will be Acting Water Division Director. He can be reached at ireland.scott@epa.gov, or 312-886-8121.

Many thanks,
Tera

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Monday, November 7, 2022 3:19 PM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew
Subject: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

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REPUBLIC SERVICES

Sustainability in Action

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Wednesday, November 30, 2022 11:41 AM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew; vugrinovichr@michigan.gov; McCuistion, Gary; Brian Ault
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Sustainability in Action

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Monday, December 19, 2022 10:56 AM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew; McCuistion, Gary; Brian Ault
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Sustainability in Action

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Tuesday, January 3, 2023 11:28 AM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew; McCuistion, Gary; Brian Ault
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Good morning,

As a follow up to my previous email with the notification for a January SAPT for IW #1, we will be ready to perform this work on Thursday January 5th 2023.

Please let me know if you have any questions or comments.

Sincerely,

Tom Rodriquez

From: Rodriquez, Tom
Sent: Monday, December 19, 2022 9:56 AM
To: Tong, William <tong.william@epa.gov>; Chase, Felicia <Chase.Felicia@epa.gov>; Fong, Tera <fong.tera@epa.gov>
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REPUBLIC SERVICES

Sustainability in Action

Odrowski, Brendan

From: Rodriquez, Tom
Sent: Saturday, January 7, 2023 8:07 PM
To: Tong, William; Chase, Felicia; Fong, Tera
Cc: Doug Torr; Rubin, Jason; Greenhagen, Andrew; McCuistion, Gary; Brian Ault
Subject: RE: Republic Services - Newton County IW #1 and #2 MIT/Fall Off Test Notification

Good evening,

As a follow up to the notification and our MIT/tracer survey, I wanted to notify you that we will be performing an acid stimulation prior to our injection fall/off test on the Newton County IW #1 well.

This is due to an increase in pressure while we were injecting for the tracer survey. As you know, our pressure limit is very low for this well, and we would like to be able to have a successful injection/fall off test. If we do not perform the acid stimulation, it would not be possible to gain enough rate and length of injection to be able to complete the injection/fall off test.

Our plan is to pump 5,000 gals of 15% HCl acid. The additives are as follows: 30 gals of corrosion inhibitor @ 6 gpt, 10 gals of iron reducing agent @ 2 gpt, and 10 gallons of non-emulsifier @ 2gpt. We will pump the acid tomorrow (1/7/23); and plan on performing the injection/fall off test on Monday (1/7/23).

Please let me know if you have any questions.

Sincerely,

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Director, Deep Well Operations Support

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
STANDARD ANNULAR PRESSURE TEST

Operator: Newton County Landfill
State Permit No.: NA
Address: 2266 East 500 South Road
Brook, IN 47922
USEPA Permit No.: IN-111-1I-0002
Date of Test: Dec 21, 2022
Well Name: Newton County Landfill IW-2
Well Type: Class I

LOCATION INFORMATION: NW Quarter of the SE Quarter of the SE Quarter of Section 28; Range 8W; Township 29N; County Newton;

Company Representative: Bill Stone; Field Inspector: EPA not present;

Type of Pressure Gauge: Digital inch face; 5000# psi full scale; .1# psi increments;

New Gauge? Yes ☒ No ☐ If no, date of calibration 12/5/22 Calibration certification submitted? Yes ☒ No ☐

TEST RESULTS
Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells.
For Class II wells, annulus pressue should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure.
Original chart recordings must be submitted with this form.

5-year or annual test on time? Yes ☐ No ☐
2-year test for TA'd wells on time? Yes ☐ No ☐
After rework? Yes ☐ No ☐
Newly permitted well? Yes ☒ No ☐

Time	Pressure (in psig) Annulus	Tubing
7:22	1056.7#	0
7:32	1058.3#	0
7:42	1060#	0
7:52	1063.3#	0
8:02	1063.3#	0
8:12	1064.8#	0
8:22	1066.3#	0

Casing size: 9-5/8", 36#, J55, LTC
Tubing size: 4-1/2", 11.6#, J55, LTC, IPC
Packer type: AS1-X, Nickel Plated
Packer set @: 3212'
Top of Permitted Injection Zone: 3,166
Is packer 100 ft or less above top of Injection Zone ? Yes ☒ No ☐
If not, please submit a justification.
Fluid return (gal.): 28.5 gal.
Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03: 31.7# psi
Test Period Pressure change: +9.6# psi

Test Passed ☒ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

Bill Stone — Bill Stone — 12/21/2022

APEX INSTRUMENTS
7200 E. Dry Creek Rd, STE C-102, Centennial, CO 80112
Ph. 303-804-0667 Cal.Lab@Apex-Instruments.com

Calibration Certificate

Certificate Number: 225131

Customer:
Impact Completions
Rensselaer, IN

Manufacturer:	Crystal Engineering	***Calibration Date:***	12/5/2022
Model Number:	XP2i 5000 psi	***Due Date:***	12/5/2023
Serial Number:	216483	***As Found:***	New
Description:	Digital Test Gauge	***As Left:***	In Tolerance
Procedure:	CI-001	***Temperature:***	71.4 F
Calibrated To:	Manufacturer's Specifications	***Humidity:***	22.6 %
Technician:	Ben Campbell	***Issue Date:***	12/5/2022

Tolerance Specs:
0 - 20%: +/- (0.02% of FS)
20% - 100%: +/- (0.1% of Rdg)

Technician Notes:

As Left Userspan: 1.00000

Approved Signatory: Ben Campbell

Apex Instruments certifies that the instrument listed above meets the specifications of the manufacturer at the completion of its calibration. The calibrations within the certificate are traceable through NIST or another National Metrology Institute to the International System of Units (SI).

Methods used are in accordance with the procedure listed above. This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

Unless otherwise contractually specified, a binary decision rule, utilizing simple acceptance, and simple rejection criteria will be used for the determination of compliance. When compliance statements are present, they are reported without factoring in the effects of uncertainty and the limits are defined by the manufacturer's stated accuracy.

This certificate does not guarantee the continued performance of the instrument listed above. Any modifications or services performed hereafter may void this certificate.

BACKGROUND INFORMATION FOR REVIEW OF RADIOACTIVE TRACER SURVEYS FOR CEMENT INTEGRITY

Facility Name			Operator		
Well Name			USEPA Permit Numbe IN-111-1I-0002	Witness	
State IN	Test Date		Logging Company MI Wireline	Depth Reference: Kelly Bushing ☑ Ground Level	

Well and Operational Information

Long StringCsg Material J-55	Long String Casing OD, ins 9.625	Casing weight, #/ft 36	Casing ID, ins. 8.921	Long String Casing Length, ft 3,277	
Tubing Material J-55	Tubing OD, ins 4.5	Tubing weight, #/ft 11.6	Tubing ID, ins. 4.0	Tubing Length, ft 3,280	
Tail Pipe Material	Tail Pipe OD, ins	Tail Pipe, weight#/ft.	Tail Pipe ID, ins.	Tail Pipe Length, ft	Tail Pipe Depth
	OpenHole diameter, in 8.5	TD, ft	PBTD, ft 5,207	Top of Open Interval, ft 3,277	
Packer Model Arrowset	Packer Type Retrievable	Top of Packer, ft 3,213	Bottom of Packer, ft		

Geological Information

Lowermost USDW Name Wabash	Fms in Confining Zone Eau Claire	Fms in Injection Zone Mt. Simon
Base of USDW, ft 857	Depth to top of Confinement Zone 2,586	Injection Zone Top, ft 3,166

TOOL INFORMATION

Ejector, ft above BDET 10	TDET, ft above BDET 5	MDET, ft above BDET N/A			

CALIBRATION INFORMATION

Depth BDET, ft 3,290	Depth TDET, ft 3,283	BDET CPSPI 0-200	Lithology (Warm/Cool) warm	Maximum Reading, LD 30	Minimum Reading, LD
Depth BDET, ft 2,550	Depth TDET, ft 2,243	BDET CPSPI 0-200	Lithology (Warm/Cool) cool	Maximum Reading, LD 3	Minimum Reading, LD 0

FIRST SLUG TRACKING SEQUENCE

Flow Rate, gpm 42	Velocity in tubing, fps 1.1	Depth of deflection on 1st pass, ft 2,340	Deflection on 1st pass, LD 570	Deflection/Backgroun 0-10	Passes Through Slug 7
Slug Split? yes or no No	Depth of Split, ft N/A	Moved up, yes or no No	Minimum Slug Depth, ft 2,212	Distance above shoe, ft 1,065	Maximum Slug Depth, ft 3,548

FIRST STATIONARY TEST

Depth of BDET, ft 3,222	Depth of TDET, ft	BDET to open interval, ft 55	Time at station, mins 60	Injection Rate, gpm 42	Log Divisions per Minute
Depth at Injection, ft 2,212		BDET above end of tubing or casing, ft 58	Reached BDET up, LD N/A	Reach UDET up, LD N/A	Velocity Up, ft/min N/A
2nd Setting Depth, ft	Time of reset	Slug already passed BDET?	Reached BDET up, LD	Slug arrival time	
3rd Setting Depth	Time of reset	Slug already passed BDET?	Reached BDET up, LD	Slug arrival time	
4th setting depth, ft	Time of reset	Slug already passed BDET?	Reached BDET up, LD	Slug arrival time	Upper Limit of Movement, ft

REMEMBER

1. Please fill in the above cells.
2. Inject at highest practicable rate during the stationary test to maximize pressure difference that is the driving force for upward movement of fluid (if it occurs), but at low enough velocity during slug tracking so the slug can be followed effectively.
3. Leave the scaling at the same level for all phases. 40 counts per second per inch is usually effective. We need to be able to see evidence of variation due to lithology.

4. Use big slugs. The height of the deflection caused by the slug should be at least 50 times the difference of the high and low levels measured during logging the initial log.

5. If you record times of arrival, that should be the arrival of the leading edge.

6. The purpose is to determine the shallowest depth at which tracer material leaves the well.

7. When slug tracking, logging through the slug while the last part of the slug is leaving the deeper of the tailpipe or casing is the best way to identify a split. If there is a split, always follow the upper portion to determine the limit of its upward movement.

8. When running the stationary test, set the tool with the bottom detector five feet above the end of the deeper of the tail pipe or casing. If the slug reaches it, move it up in steps to find the shallowest extent of movement.

9. The stationary test must be run long enough to be able to detect upward motion of 2 ft/min.
10. Superimpose the traces of the initial and final base logs.

11. Please submit both the merged and unmerged slug chase records.

12. The test report must explain any anomalies in the results.

13. Please submit the digital logging data on a CD.

14. Submit an up-to-date well schematic.

BACKGROUND INFORMATION FOR REVIEW OF TEMPERATURE LOGS

Facility Name		Operator	
Well Name		USEPA Permit Number IN-111-1I-0002	State Permit Number
County, State Newton, IN	Test Date	Depth Reference: Kelly Bushing	Ground Level

Well and Operational Information

Top of Open Interval, ft	Tubing Depth, ft	Date of Last Injection	Is This a Multi-Zone Facility?
3,277	3,280	12/21/2022	No
Depth to Base of USDW, ft.	Name of lowermost USDW	Hour of Last Injection	Other Zones Used at Facility
857	Wabash	1200	N/A
Depth to Top of Permitted Int, ft	Name of Injection Interval	Volume Injected in Past Year, gal	Name of Shallower Injection Zone
3,166	Mt. Simon	N/A	N/A
Plugged Back Depth, ft.	Total Depth, ft	Injectate Temperature Variance, ° F	Depth to Shallower Injection Zone, ft
5,207	5,207	N/A	N/A

Calibration Information		Logging Information	
Low Gauge Temperature, ° F	High Gauge Temperature, ° F	Time of Start of Logging	
45.2	92.9	0850	
Low Thermometer Temperature, ° F	High Thermometer Temperature, ° F	Days Since Last Injection	Maximum Log Depth, ft.
45.5	93.3	7	5,206
Were Log Readings Adjusted?	Gauge Calibration Date	Multiple Log Runs?	Maximum Logging Speed, ft/min
No	12/14/2021	No	30

REMEMBER

1. Please fill in the above cells.
2. The well should have been shut in for at least 36 hours or until temperatures have stabilized (based on previous logs).
3. If the well cannot be shut in for 36 hours, shut in as long as possible and run two logs at least six hours apart.
4. Calibrate the temperature tool at two different temperatures immediately prior to running the test.
5. Record log data at least once per foot.
6. Record natural gamma ray activity log with temperature.
7. Log top to bottom. Keep logging speed below 30 feet per minute.
8. Log quality in air-filled holes can be improved by logging at a slower speed. Please reduce logging speed to less than 20 feet per minute in the top 1000 feet of air-filled holes.
9. The report on the test must explain any anomalies shown on the log.
10. Submit digital logging data on a CD in .las or .asc format.
11. Submit an up-to-date well schematic.

BACKGROUND INFORMATION FOR ANALYSIS OF PRESSURE FALL-OFF TEST

FACILITY NAME		OPERATOR	
Newton County Landfill		Republic Services	
WELL NAME		USEPA PERMIT NUMBER	STATE PERMIT NUMBER
IW-2		IN-111-1I-0002	
TEST START DATE	TEST END DATE	Depth Reference:	
12/31/2022	1/2/2023	Kelly Bushing □	Ground Level □

GEOLOGICAL DATA

POROSITY, decimal	NET PERMEABLE THICKNESS, ft.	VISCOSITY, cp.	COMPRESSIBILITY, per psi
.10	583	0.82	9.04E-6

WELL AND OPERATION DATA

LONGSTRING CASING DIAMETER, ins	FINAL PRETEST FLOW RATE, gpm	INJECTATE TEMPERATURE, deg.F	KB ELEVATION, ft
9.625	45.9	53.8 (BHT)	17
OPEN HOLE DIAMTER, ins	PRETEST FLOW TIME, hrs. **SEE BELOW**	SPECIFIC GRAVITY OF TEST FLUID	TEST DEPTH FOR COMPARISON, ft
8.5	18.0	1.01	3,153
GAUGE DEPTH, ft		CUMULATIVE VOLUME INJECTED SINCE LAST PRESSURE EQUALIZATION,	

TEST DATA

GAUGE CALIBRATION DATE			
10/26/22			
FLOW RATE, gpm	PRESSURE AT BEGINNING OF FALL-OFF, p	PRESSURE AT END OF FALL-OFF, ps	TO SUPPORT FULL COLUMN, psi
45.9			
TEST LENGTH, hrs.	INITIAL GRADIENT, psi/ft.	FINAL GRADIENT, psi/ft.	FINAL FLUID LEVEL, ft.
23.4	0.439	0.423	114

REMEMBER

"Pre-test flow time" is the time since the reservoir was last in equilibrium. This may be the time since the well was last shut-in but only if the well was shut-in long enough for the pressure in the reservoir to approach equilibrium pressure.

1. Please fill in the above cells.
2. Injection of normal injectate at normal rate is preferred.
3. Submit an up-to-date well schematic.
4. The well should be shut-in as quickly as possible.
5. Data should be collected at the maximum rate for at least the first five minutes; between five and thirty minutes at no less than one reading every 30 seconds. After thirty minutes, the operator can reduce frequency as required.
6. The pressure gauge should have been calibrated no more than a year prior to the test. Submit a copy of the calibration certificate for the gauge used for pressure measurements with your report.
7. The report on the test must explain any anomalies shown in the results.
8. Submit digital logging data on a CD in .las or .asc format.

OMB No. 2040-0042 Approval Expires 4/30/2022

United States Environmental Protection Agency

COMPLETION REPORT FOR INJECTION WELLS

Name, Address, Phone Number and/or Email of Permittee

Newton County Landfill
2266 East 500 South Road, Brook, IN 47922
(219) 224-4225

State	County
Indiana	Newton

Permit (or EPA ID) Number	API Number	Full Well Name
IN-111-1I-0002		IW - 2

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface Location

SE 1/4 of SE 1/4 of Section 28 Township 29N Range 8W

684 ft. from (N/S) S Line of quarter section

229 ft. from (E/W) E Line of quarter section.

Latitude 40.928028

Longitude -87.334667

Anticipated Daily Injection Volume (Bbls)		Injection Interval (Perforated/Open Hole Interval)	
Average	Maximum	Feet	to Feet
		3277	5207

Depth to Bottom of Lowermost USDW (Feet) 486

Date Drilling Began

08/26/2022

Date Drilling Completed

10/14/2022

Date Well Completed

01/02/2023

Name of Injection Zone

Mt. Simon

Fracture Pressure of Injection Zone

Permeability of Injection Zone

9.6 md

Porosity of Injection Zone

9%

Complete Attachments; See Instructions.

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR § 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed
Scott Binder; Area President	DocuSigned by: Scott Binder 5EF2E680E3784DE...	2/10/2023

INSTRUCTIONS FOR FORM 7520-18

This form must be completed for each injection well. This form is appropriate for all injection well classes, and replaces the previous Form 7520-9 and Form 7520-10. While reports or other information developed by contractors or service companies may be attached, this form must be signed by a responsible entity as described at 40 CFR 144.32.

NAME, ADDRESS, PHONE AND/OR EMAIL OF PERMITTEE: Enter the name and street address, city/town, state, and ZIP code of the permittee. Also provide an email address (if available) and/or a phone number.

Enter the **STATE** and **COUNTY** where the well is located. For States that do not have counties, use the name of that State's equivalent jurisdiction at a more local level.

PERMIT OR EPA ID NUMBER: Enter the well identification number or permit number assigned to the injection well by the EPA or the permitting authority.

API NUMBER: Enter the number assigned by the local jurisdiction (usually a State Oil and Gas Agency) using the American Petroleum Institute standard numbering system.

FULL WELL NAME: Enter the full name of the well or project.

WELL LOCATION: Fill in the complete township, range, and section to the nearest quarter-quarter section. A township is north or south of the baseline, and a range is east or west of the principal meridian (e.g., T12N, R34W). Also include the distance, in feet, from the nearest north or south line and nearest east or west line of the quarter-section. Also, enter the **latitude** and **longitude** of the well in decimal degrees, to five or six places if possible; be sure to include a negative sign for the longitude of a well in the Western Hemisphere and a negative sign for the latitude of a well in the Southern Hemisphere.

ANTICIPATED DAILY INJECTION VOLUME: Enter the anticipated **average** and **maximum** daily volume of fluid to be injected, in barrels.

INJECTION INTERVAL: Enter the depths, in feet, to the top and bottom of the perforated hole/open interval of the well through which injected fluids will exit the well. (Note: this is different from the depth of the injection zone.) Provide information about how these were derived, e.g., by attaching a step-rate test or other test results. (See the description of attachments below.)

Enter the **DEPTH TO BOTTOM OF THE LOWERMOST USDW** (i.e., formation containing less than 10,000 mg/L total dissolved solids), in feet.

Enter the **DATE DRILLING BEGAN**, the **DATE DRILLING WAS COMPLETED**, and the **DATE THE WELL WAS COMPLETED** in the appropriate blanks.

Enter information about the permitted injection formation, including the **NAME OF THE INJECTION ZONE**, the calculated **FRACTURE PRESSURE**, and the **PERMEABILITY** and **POROSITY** of the injection zone in the appropriate blanks.

CERTIFICATION: This form must be signed and dated by either: a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, or by a principal executive or ranking elected official for a public agency.

PAPERWORK REDUCTION ACT NOTICE: The public reporting and recordkeeping burden for this collection of information is estimated to average between 3.3 and 3.9 hours per response, depending on the injection well class. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

INSTRUCTIONS FOR COMPLETING ATTACHMENTS TO FORM 7520-18

Please attach the following information to the completion report. Reports prepared by contractors or service companies may be submitted, provided they are clear and legible and the requested information is accessible. Please be sure to specify units as needed, e.g., of depth, pressure, temperature, etc.

I. Geologic Information

1. Provide a geologic description of the rock units penetrated by name, age, depth, thickness, and lithology of each rock unit penetrated.

2. Provide information about the injection formation that supports the information provided on the form, for example: (1) name; (2) depth (drilled); (3) thickness; (4) formation fluid pressure; (5) age of unit; (6) bottom hole temperature; (7) lithology; and (8) bottom hole pressure.

3. Provide chemical characteristics of formation fluid, including a chemical analysis.

4. Provide a description of all USDWs, including: (1) depth below ground surface to base of fresh water (less than 10,000 mg/L TDS); and (2) a geologic description of aquifer units with name, age, depth, thickness, lithology, and average total dissolved solids.

II. Well Design and Construction

1. Provide information on the surface, intermediate, and long string casing and tubing. Describe: the materials used; outside diameter size; weight/foot, grade, and whether new or used; and the depth to which each casing string is set (include appropriate units, e.g., below ground surface, below Kelly bushing, etc.).

2. Provide data on the holes drilled for each casing string, including the bit diameter and depth of hole.

3. Provide data on the well cement for each casing string, such as type/class, additives, amount, method of emplacement, and depth to top of cement.

4. Describe the packer (if used) such as type, name and model, setting depth, and type of annular fluid used.

5. Provide data on centralizers, including number, type, and depth.

6. Provide data on bottom hole completions, including the depth and diameter of the hole.

III. Monitoring Systems. Describe the recording and nonrecording injection pressure gauges, casing-tubing annulus pressure gauges, injection rate meters, temperature meters, and other meters or gauges. Also provide information on constructed monitoring wells such as location, depth, casing diameter, method of cementing, etc.

IV. Logging and Testing Results. Provide a report describing the types of geophysical logs, cores, and other tests performed; date of the logs; the intervals logged; and interpretation of the results. Include a description and the results of deviation checks run during drilling. If requested, provide a final print of all geophysical logs run.

V. As-built Schematic. Provide a diagrammatic sketch of the surface and subsurface construction details of the injection well as-built, showing casing, cement, tubing, packer, etc., with proper setting depths. The sketch should include the well head and gauges.

VI. Mechanical Integrity Testing. Provide data demonstrating mechanical integrity pursuant to 40 CFR 146.08. Describe the method and results of mechanical integrity testing.

VII. Report on the compatibility of injected wastes with fluids and minerals in both the injection zone and the confining zone.

VIII. Report the status of corrective action on deficient wells in the area of review.

IX. Include the anticipated maximum pressure and flow rate at which injection will operate.

X. Stimulation. Describe any stimulation performed, including the interval treated and the materials and amounts used.

OMB No. 2040-0042 Approval Expires 4/30/2022

United States Environmental Protection Agency

WELL REWORK RECORD, PLUGGING AND ABANDONMENT PLAN, OR PLUGGING AND ABANDONMENT AFFIDAVIT

Name and Address, Phone Number and/or Email of Permittee

Newton County Landfill
2266 East 500 South Road, Brook IN 47922

Permit or EPA ID Number	API Number	Full Well Name
IN-111-1I-0002		IW-2

State	County
Indiana	Netwon

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface Location

SE 1/4 of SE 1/4 of Section 28 Township 29N Range 8W

Latitude 40.927933

Longitude 87.334683

684 ft. from (N/S) S Line of quarter section

229 ft. from (E/W) E Line of quarter section.

Well Class	Timing of Action (pick one)	Type of Action (pick one)
✔ Class I	✔ Notice Prior to Work	☐ Well Rework
☐ Class II	Date Expected to Commence N/A	✔ Plugging and Abandonment
☐ Class III	☐ Report After Work	☐ Conversion to a Non-Injection Well
☐ Class V	Date Work Ended	

Provide a narrative description of the work planned to be performed, or that was performed. Use additional pages as necessary. See instructions.

NEWTON COUNTY LANDFILL IW-2 PLUGGING AND ABANDONMENT PLAN
1. Notify regulatory agencies a minimum of 30 days prior to commencement of plugging operations.
2. Prepare well and location for plugging. Move in and rig up well servicing rig, pipe racks and tanks.
3. Install a test gauge on the annulus to perform a static annulus pressure test. Ensure that the annulus is fluid filled and that the well has been shut-in for a minimum of 24 hours. Pressurize annulus and isolate from the annulus system. Monitor
annular pressure for one hour.
4. Displace tubing with kill brine as needed to control wellhead pressure. Dismantle wellhead and install blow-out preventer. Displace annulus with kill brine as needed to control pressure. Fluid compatibility with cement to be used will be verified.
5. Remove injection tubing and packer. If packer will not unseat, proceed with fishing operations as needed to remove packer from hole or obtain approval to set retainer above packer and pump cement through retainer and abandoned packer.
6. Make up mechanical retainer on work string and trip in hole. Set cement retainer at top of injection interval just above historical packer setting depth. Test cement retainer to 500 psig.
7. Move in cement and cementing equipment.
8. Displace hole below retainer with Class "L" cement or equivalent. Unsting from retainer and spot 50 additional sacks (sx) on top of retainer. Cement volume has been calculated based on the following volumes:
• 8-1/2" hole from 3,277 feet GL to 5,207 feet GL, at 0.3941 ft3/ft = 761 ft3
• 9-5/8" casing from surface to 3,277 feet GL, at 0.4341 ft3/ft = 1,423 ft3
• 50 additional sacks with a yield of 1.18 ft3/sack = 59 ft3
The total volume of the plugs is estimated to be 2,184 ft3, which is equivalent to 1,851 sx of Class "L" cement with a yield of 1.18 ft3/sack. If wellbore fill is present, this volume may have to be reduced or squeezed into the openhole of the injection interval or
approval obtained to reduce cement volume based on open hole conditions.
9. Once cement has been tagged on top of the retainer, spot successive, continuous balanced cement plugs in 1,500' intervals from top of cement retainer to surface (3 intervals required). Cement to be API Class 'L' or equivalent with not more than 4% bentonite.
If neat Class 'L' cement is pumped it will have the following slurry properties.
• Water ratio – 4.71 gallons per sack
• Slurry weight – 15.8 pounds per gallon
• Slurry volume – 1.13- ft3/sack
An estimated 1,073 sacks, or 1,267cubic feet, of slurry will be required above retainer.
10. Remove BOP and wellhead equipment
11. Cut off wellhead approximately 4 feet BGL and weld cap with permanent marker on casing.
12. Rig down and move out all equipment.
13. Prepare and file USEPA Plugging Reports.
The steel plate will be inscribed with the disposal well identification information and the date of plugging. Federal representatives will have been invited to witness the plugging and sign the plug and abandonment form.

PLUGGING AND ABANDONMENT COST ESTIMATE
$255,000

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR § 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed
Scott Binder; Area President	DocuSigned by: Scott Binder 5EE2E680E3784DE...	2/10/2023

INSTRUCTIONS FOR FORM 7520-19

This form replaces forms 7520-12 and 7520-14. Use this form only when work is planned or has occurred that affects the well's construction or operation as an injection well, including work on the casing, tubing or packer (or for shallow Class V wells, the subsurface fluid emplacement network). Use one form per injection well. While reports or other information developed by contractors or service companies may be attached, this form must be signed by a responsible entity as described at 40 CFR 144.32. Note: operators closing Class V wells should use Form 7520-17.

NAME, ADDRESS, PHONE AND/OR EMAIL OF PERMITTEE: Enter the name and street address, city/town, state, and ZIP code of the permittee. Also provide an email address (if available) and/or a phone number.

PERMIT OR EPA ID NUMBER: Enter the well identification number or permit number assigned to the well by the EPA or the permitting authority.

API NUMBER: Enter the number assigned by the local jurisdiction (usually a State Oil and Gas Agency) using the American Petroleum Institute standard numbering system.

FULL WELL NAME: Enter the full name of the well or project.

Enter the **STATE** and **COUNTY** where the well is located. For States that do not have counties, use the name of that State's equivalent jurisdiction at a more local level.

WELL LOCATION: Fill in the complete township, range, and section to the nearest quarter-quarter section. A township is north or south of the baseline, and a range is east or west of the principal meridian (e.g., T12N, R34W). Also include the distance, in feet, from the nearest north or south line and nearest east or west line of the quarter-section. Also, enter the **latitude** and **longitude** of the well in decimal degrees, to five or six places if possible; be sure to include a negative sign for the longitude of a well in the Western Hemisphere and a negative sign for the latitude of a well in the Southern Hemisphere.

Enter the **WELL CLASS,** i.e., the class of injection well as defined in 40 CFR 144.6.

TIMING OF THE ACTION: Check ***Notice prior to work*** if the activity has not yet occurred (i.e., is planned). Check ***Report after work*** if the activity described has already occurred. As appropriate, include the date the activity is expected to start or the date the activity was completed. (Note this may not be available, e.g., for a plugging plan submitted with a permit application.)

TYPE OF ACTION: Check the appropriate box to describe the kind of activity being reported. Check ***Well Rework*** for work that was/will be performed on the well after it has already been in operation as an injection well. Check ***Plugging and Abandonment*** to report on plans for or descriptions of final closure/plugging after use as an injection well. Check ***Conversion to a Non-Injection Well*** if the well is to be converted to something other than an injection well.

Provide a **NARRATIVE DESCRIPTION** of the work planned to be performed, or that was performed. The narrative should include a description of the main procedures planned or that occurred during the work activity. A service company report, daily report, or similar document may be attached if it includes all the requested information and is clear and legible.

For well reworks, include the following information: The reason for the well rework; depths of activity; type of activity; changes to injection well configuration, well casing, or cement behind casing; any plug added to the well and its depth; any newly drilled interval and its depth; method(s) to demonstrate that the well has mechanical integrity (as applicable); and any deviations from the approved rework plan (as applicable).

For a well plugging plan, include the following information: Reason for the well plugging; number of plugs placed, and their depths; materials used as plugs (e.g., cast iron bridge plug, cement, cement retainer); method to set plugs; and wait-on-cement times, if any. Also provide one or more cost estimates from an independent firm in the business of plugging and abandoning wells to plug the well as described in the plan.

For well plugging affidavit, include the following information: Reason for the well plugging; number of plugs placed, and their depths; materials used as plugs (e.g., cast iron bridge plug, cement, cement retainer); method to set plugs; wait-on-cement times, if any; and any deviations from the approved plugging plan (if applicable).

For conversion to a non-injection well, include the following information: Depths of activity; type of activity; changes to injection well configuration, well casing, or cement behind casing; any plug added to the well and its depth; any newly drilled interval and its depth; depths of new perforations; and method(s) to demonstrate that the well has mechanical integrity (as applicable).

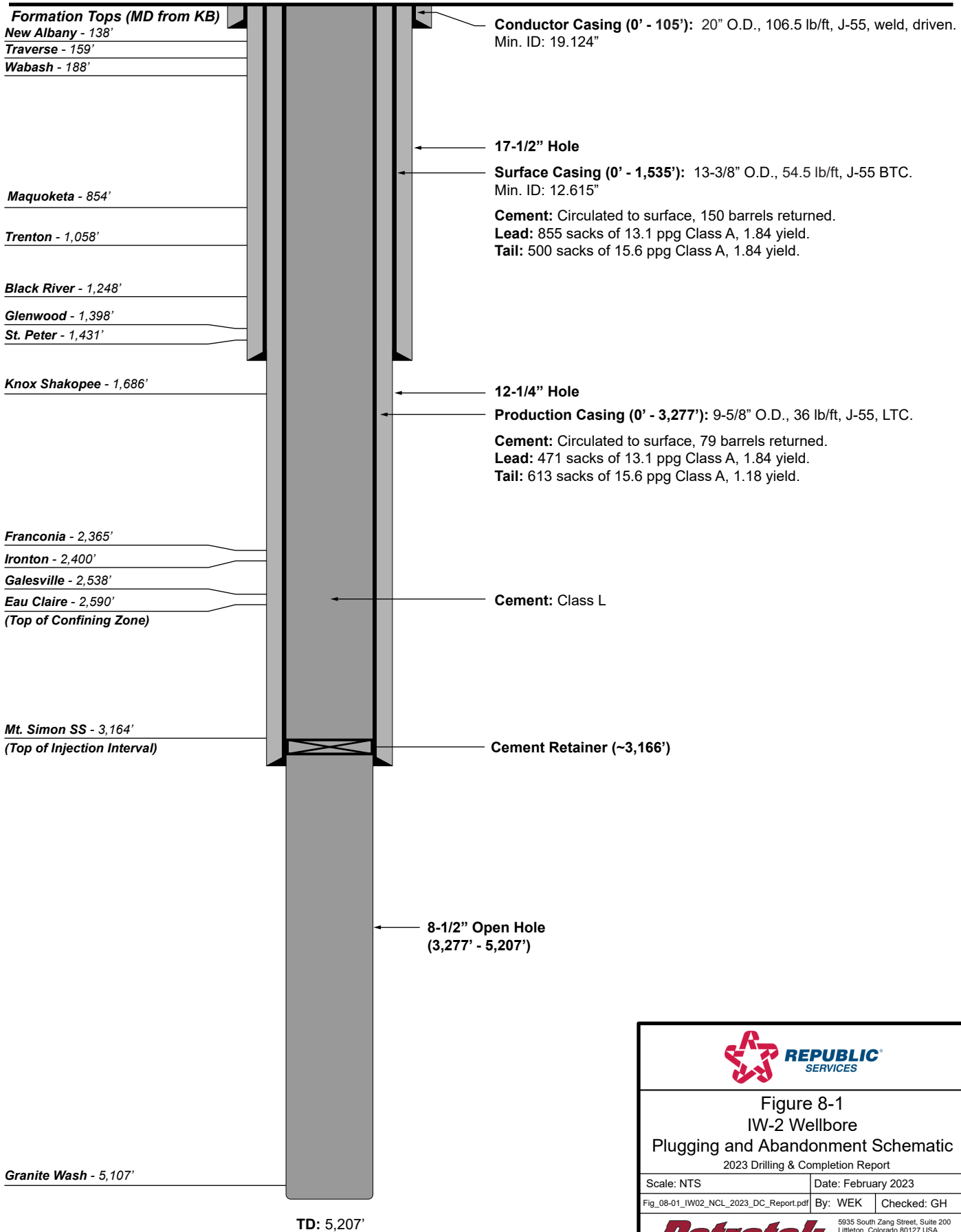
For all of the above activities, include a well sketch depicting the work, results of well tests/logging performed, service company tickets, and any other available information demonstrating how the work was/is to be performed. Also, specify whether depths are below ground surface, relative to Kelly bushing, etc.

CERTIFICATION: This form must be signed and dated by either: a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, or by a principal executive or ranking elected official for a public agency.

PAPERWORK REDUCTION ACT NOTICE: The public reporting and recordkeeping burden for this collection of information is estimated to average between 6.0 and 7.9 hours per response, depending on the injection well class. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW., Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

US EPA Permit: IN-111-1I-0002
API: 21-139-62002-70-00
Newton County, Indiana
NE, Sec. 28, T29N, R08W
Lat: 40.939767° / Long: -87.338797° (NAD 83)

Note: All measurements are TVD from Kelly Bushing (KB), 17 feet above ground surface.
KB Elevation: 721' AMSL
GL Elevation: 704' AMSL



NOT TO SCALE

REPUBLIC SERVICES

Figure 8-1
IW-2 Wellbore
Plugging and Abandonment Schematic
2023 Drilling & Completion Report

Scale: NTS	Date: February 2023	
Fig_08-01_IW02_NCL_2023_DC_Report.pdf	By: WEK	Checked: GH

Petrotek
5935 South Zang Street, Suite 200
Littleton, Colorado 80127 USA
303-290-9414
www.petrotek.com

Attachment 9
Annulus Pressure Gauge Certifications

Pages 224 to 382 of the original report (159 pages) have been redacted under FOIA Exemption 9, Geological or geophysical information and data concerning wells; information of technical or scientific nature.